ELECTRICAL REVIEW

FRIDAY
MAY 1960

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HE GENERAL ELECTRIC CO. LTD. OF ENGLAND, SWITCHGEAR DIVISION, BIRMINGHAM 6

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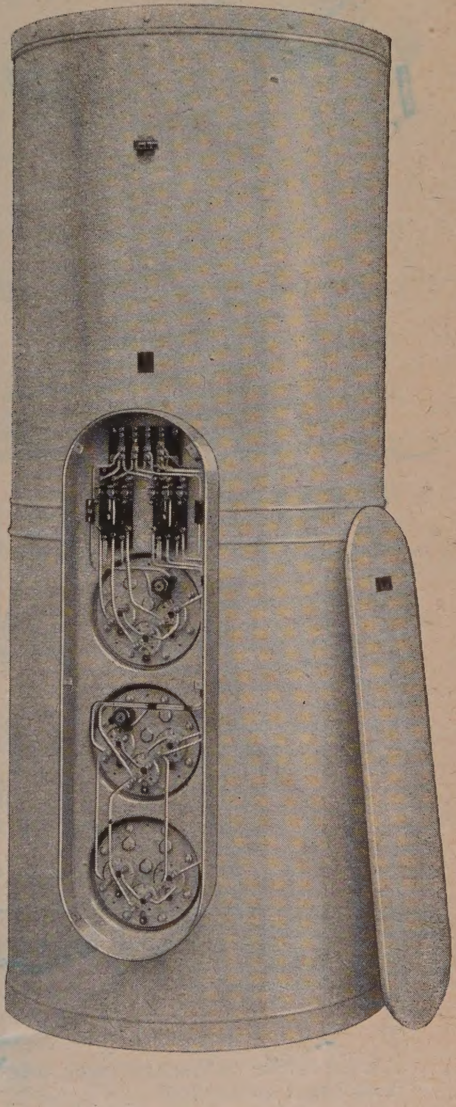

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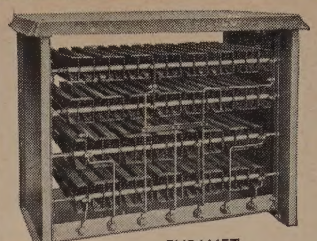
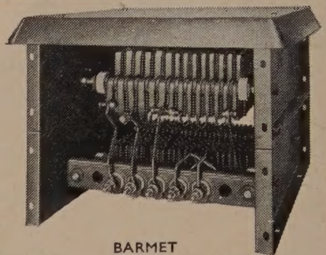
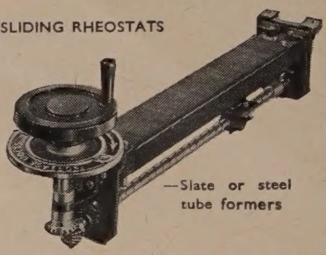
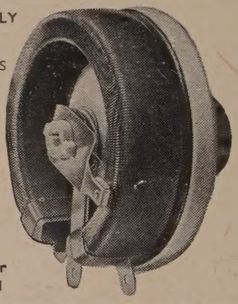

EXPAMET
—Heavy Duty Expanded Metal Resistors


BARMET
—Short time rated strip wound resistors

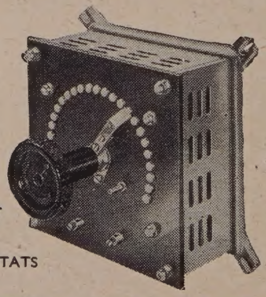
SLIDING RHEOSTATS


—Slate or steel tube formers

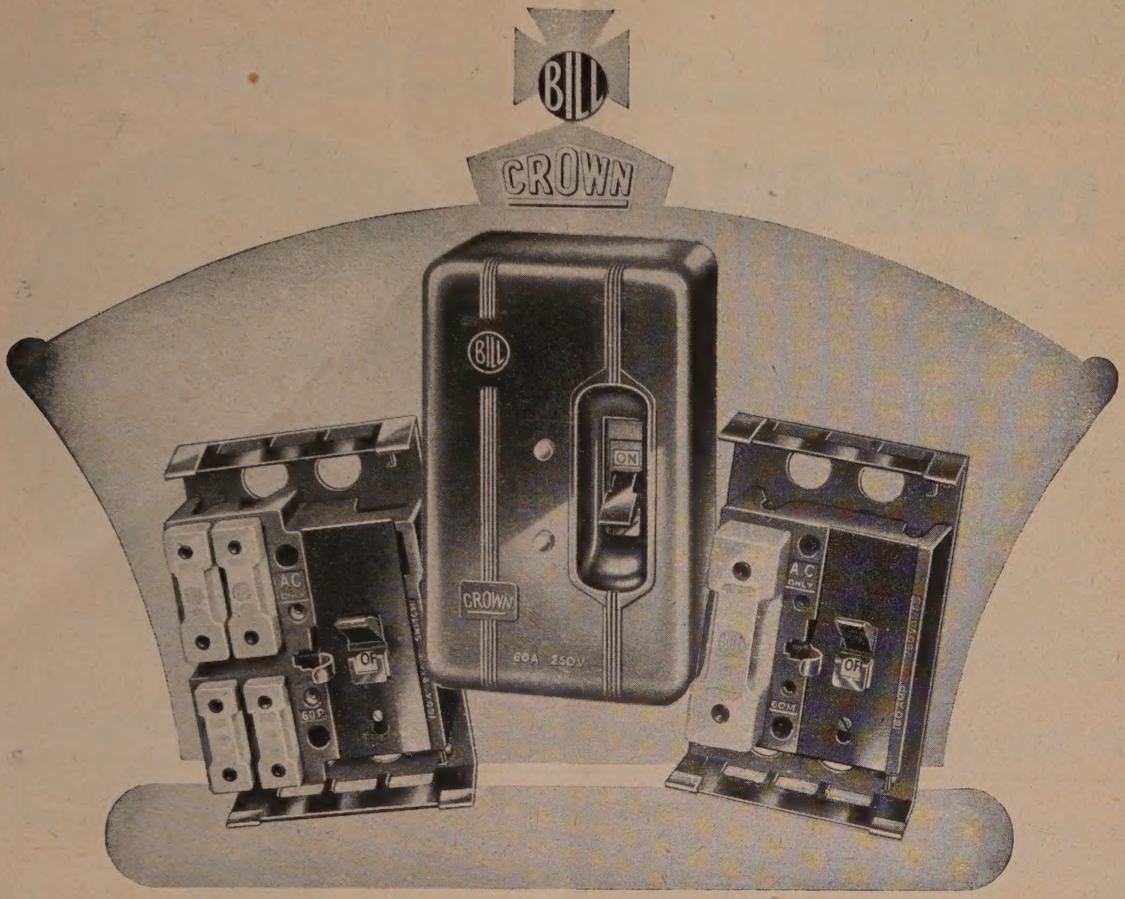
TOROIDALLY WOUND RHEOSTATS


—vitreous enamelled or open wound

Just a few items from the comprehensive range of EXPAMET - CRESSALL electrical equipment


SHUNT FIELD RHEOSTATS

You cannot buy better gear



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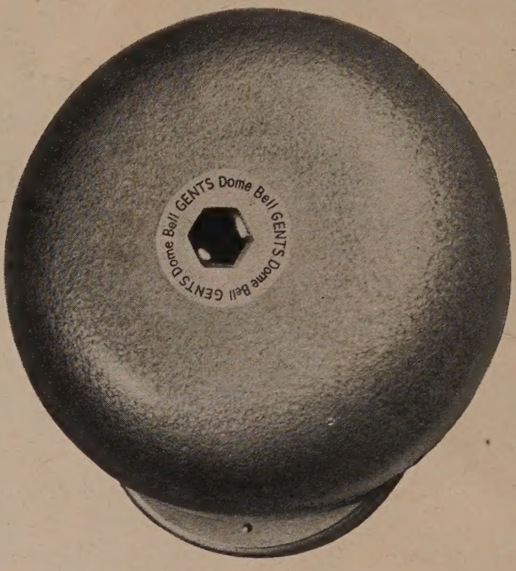
For neat appearance and easy fixing

This good-looking efficient DOME-BELL is specially designed for neat easy fixing—reducing installation costs. A separate fixing plate, common to all sizes of bell and completely interchangeable, is provided with slotted holes for securing it to most standard conduit boxes and allows for box fixing inaccuracies. Separate wall plugging for bell fixings is thus eliminated. The bell is fixed and connected to the circuit by plugging into the socket on the fixing plate and is secured by two retaining screws. Earth connection is automatically established.

Available in 4", 6", 8" and 10" diameter gong sizes. Gongs are stove-enamelled grey with a "hammer" finish and the centre bolt is bright nickel-plated. Totally enclosed dust and dirt-proof contactless movement, ensures no radio or television interference. For operation on 40/50 cycles in a wide range of voltages. (On 60 cycles at special request.)

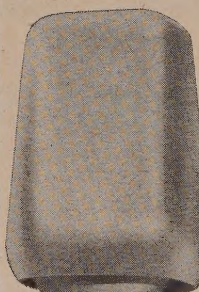


'UNDERDOME' BELLS

Available with nickel-plate and laquered Dome gong in 3" and 4" diam. sizes and with 3" diam. bright nickel-plated Church gong.* Supplied in the following voltages:

Fig. 396 3" A.C./D.C. 3-4½v. 7/8, 12v. 8/10, 24v. 10/4. Fig. 392 3" A.C. 4-6v. 7/- *Extra for 3" Church gong 2/4. Fig. 396 4" D.C. 4½-6v. 16/- Fig. 396 4" A.C. 8v. 16/-

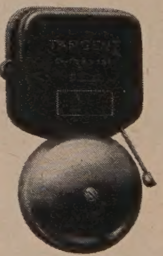
'NEATABELL' ALL-IN-ONE BATTERY BELL

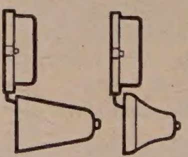


An ideal domestic bell having its own batteries and 3" deep section bell under a specially designed cover which acts as an amplifier. Both base and cover are made of white resilient shatter-proof plastic. Uses two Ever Ready batteries No. U11 or equal. Easily installed in a few moments by wiring push to two terminals at back. Fitted with TV. suppressor. Gong finished nickel plate and lacquered.

Fig. 400. Packed individually in attractive cartons (excluding batteries) 12/8

BAKELITE-CASED BELLS





Available with 3" diam. nickel-plate and lacquered Dome gong, 3" diam. bright nickel-plated Church gong or bright nickel-plated Sheep gong.* Supplied in the following voltages:—

Fig. 391 Battery working (D.C.) 3-4½v. 10/4, 6v. 13/- 12v. 13/-, 24v. 14/6. Fig. 391 Transformer working (50 cycles A.C.) 3-4½v. 10/4, 8v. 10/2, 12v. 10/2, 24v. 11/8 *Extra for Church gong 2/4 *Extra for Sheep gong 3/8

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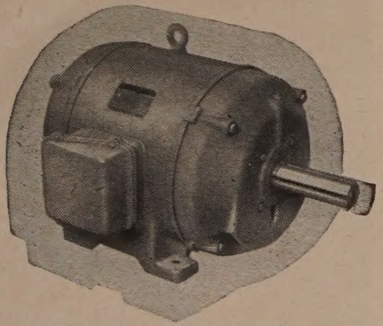
Compact horse-power

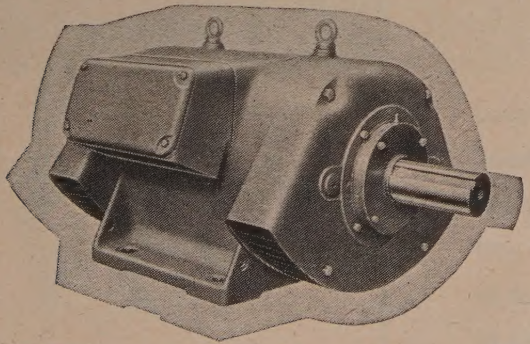
with class 'E' insulation

Drip-proof Squirrel-cage motors

with class 'E' insulation



Type KN-C... 1 to 75 h.p.

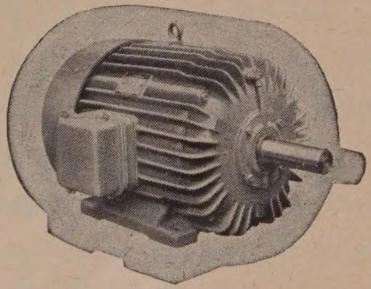


Type NC ...... 80 to 285 h.p.

The use of class 'E' insulation—permitting a temperature rise of 65°C—makes these AEI squirrel-cage motors smaller for a given horse-power rating than the conventional class 'A' insulated machines.

Totally-enclosed, fan-cooled Squirrel-cage motors

with class 'E' insulation



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Associated Electrical Industries Limited

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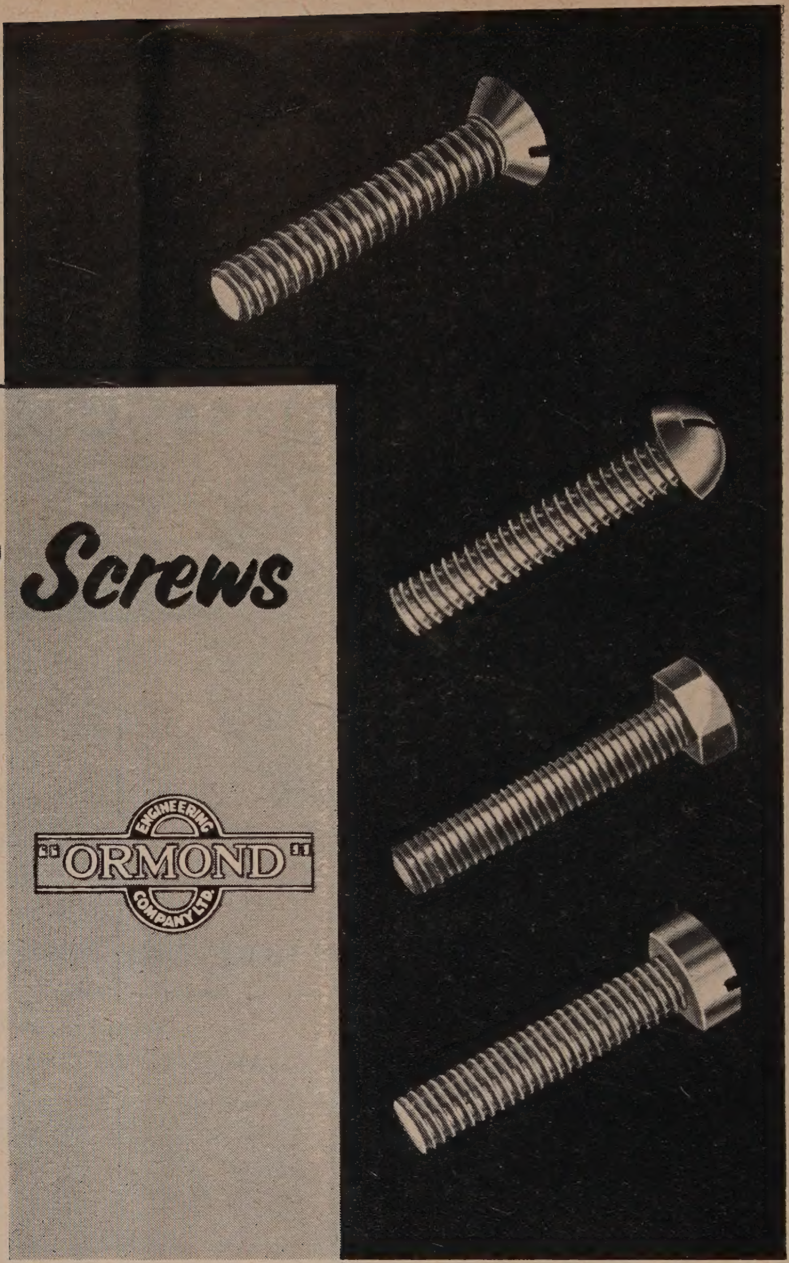

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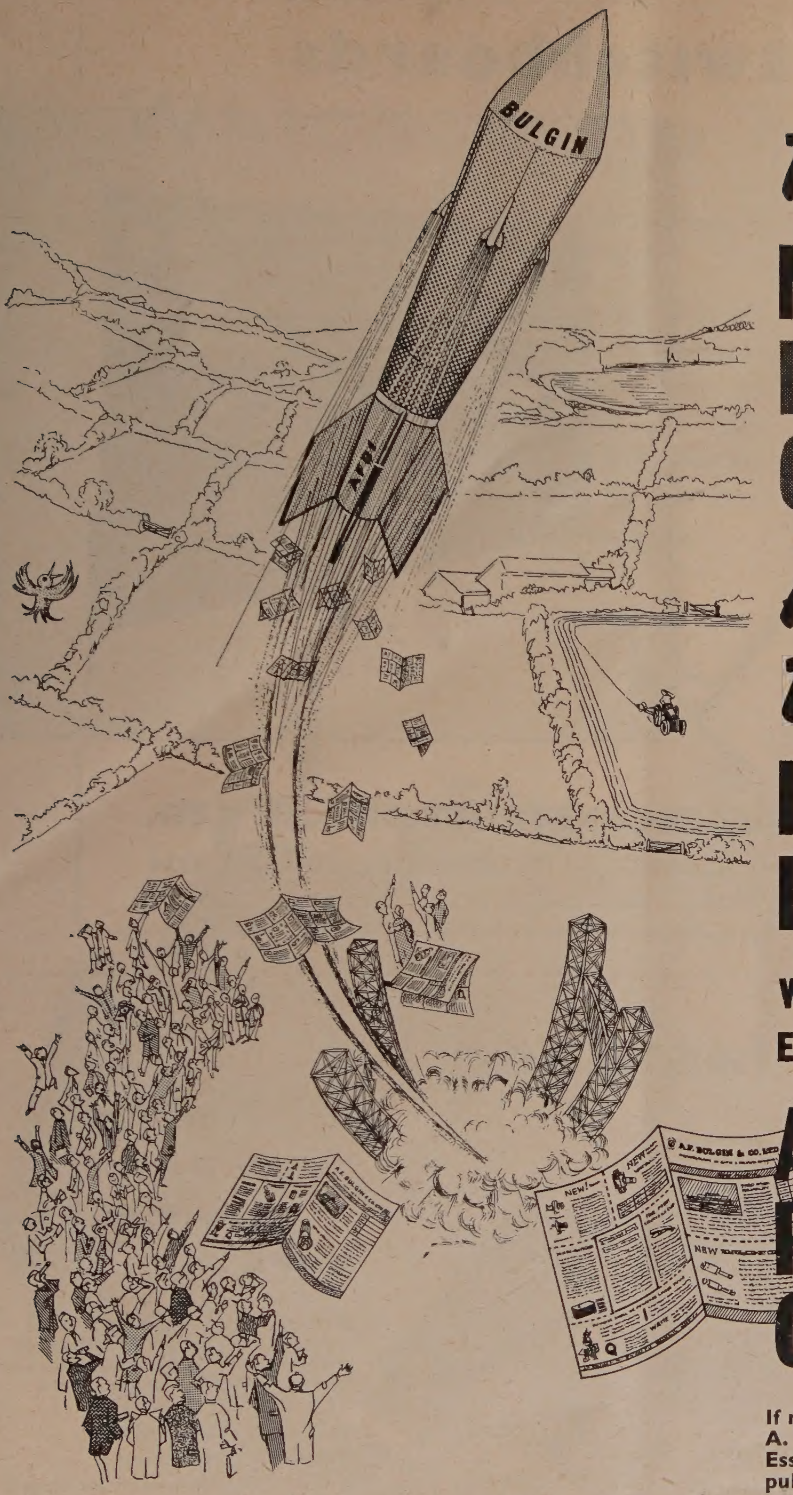

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Laboratory Switchboards

for

Technical Colleges

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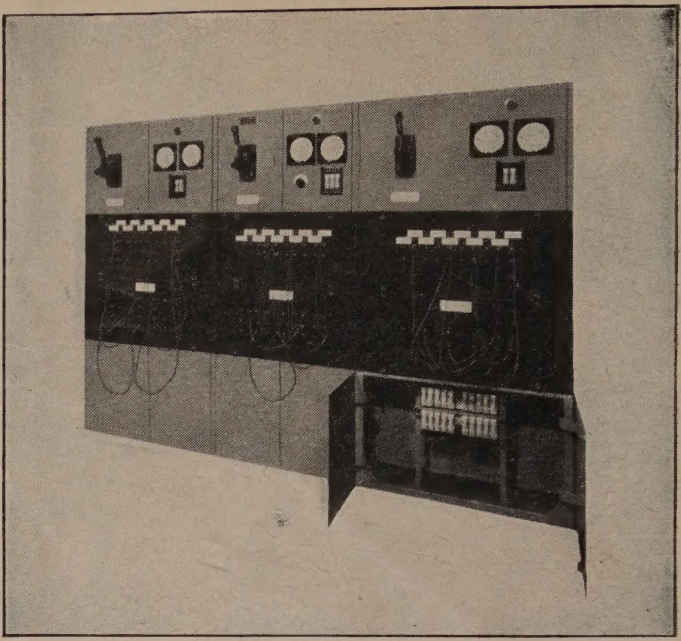
Switchboards of the type illustrated have been developed for use in large technical colleges and similar establishments where it is necessary to provide a variety of power supplies for the wide range of experimental work carried out in the electrical departments. This particular board caters for single and three phase A.C. and two/three wire D.C. at various voltages. Flexible leads plugged into the face of the switchboard enable any supply to be fed to any required bench or machine.

The Company invites enquiries for further information about this equipment and will gladly arrange for a technical representative to discuss details with any interested person.



THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.

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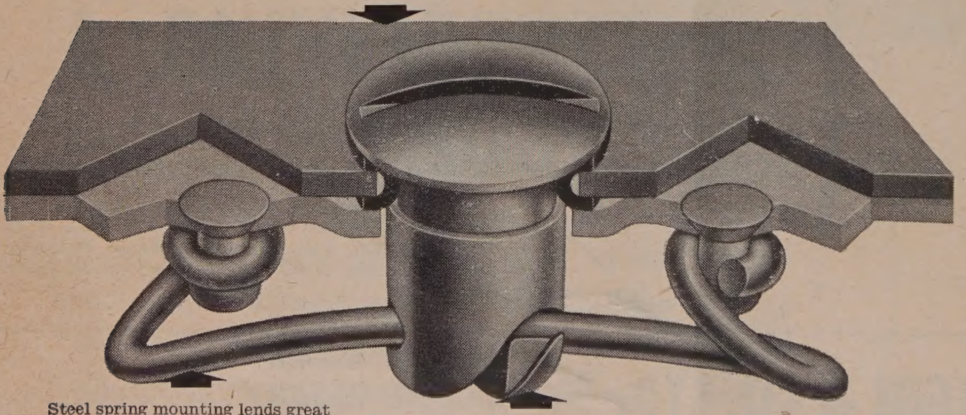
the fastest fastener

The locked position. The Dzus Fastener is instantly unlocked by a quarter turn anti-clockwise.



Steel spring mounting lends great strength and guards against loosening, however intense the vibration.

Cam operation ensures smooth easy working yet unbreakable grip; fastener supplied to suit any thickness.

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- ● Dzus are fasteners with a world reputation for reliability. They can be fitted quite simply in any solid or laminated material regardless of thickness.
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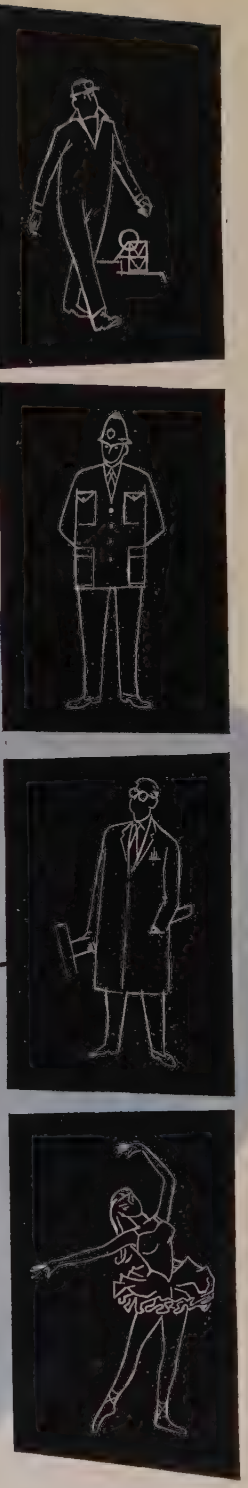
Which lamp?

To get the right light on the subject is half-way to success; the rest is a matter of performance.

And the SKF organisation certainly doesn't believe in hiding its light under a bushel. With an exchange of technical information on applications that is international, Skefko have either met your problem before or can draw on the best in research and manufacturing resources to settle it for good—in fact for *your* good!



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THE ONLY BRITISH MANUFACTURER OF ALL FOUR BASIC BEARING TYPES: BALL, CYLINDRICAL ROLLER, TAPER ROLLER & SPHERICAL ROLLER

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LANTEX LAMINATED TUBES

Lantex Laminated Tubes are being used in ever increasing numbers—not only in the electrical and radio industries but in other fields, too, where their mechanical properties are proving so useful in giving the answer to problems which in the past have been only partly solved.

The raw material and every stage of manufacture is carefully controlled by regular laboratory batch testing, and the buyer has every assurance that our products are to a constant standard of quality.

Tubes are now made in round or rectangular section from paper, cotton fabric or asbestos bonded with phenolic resins, or from woven glass bonded with phenol, polyester, epoxy or silicone resins.

LANGLEY LONDON LIMITED

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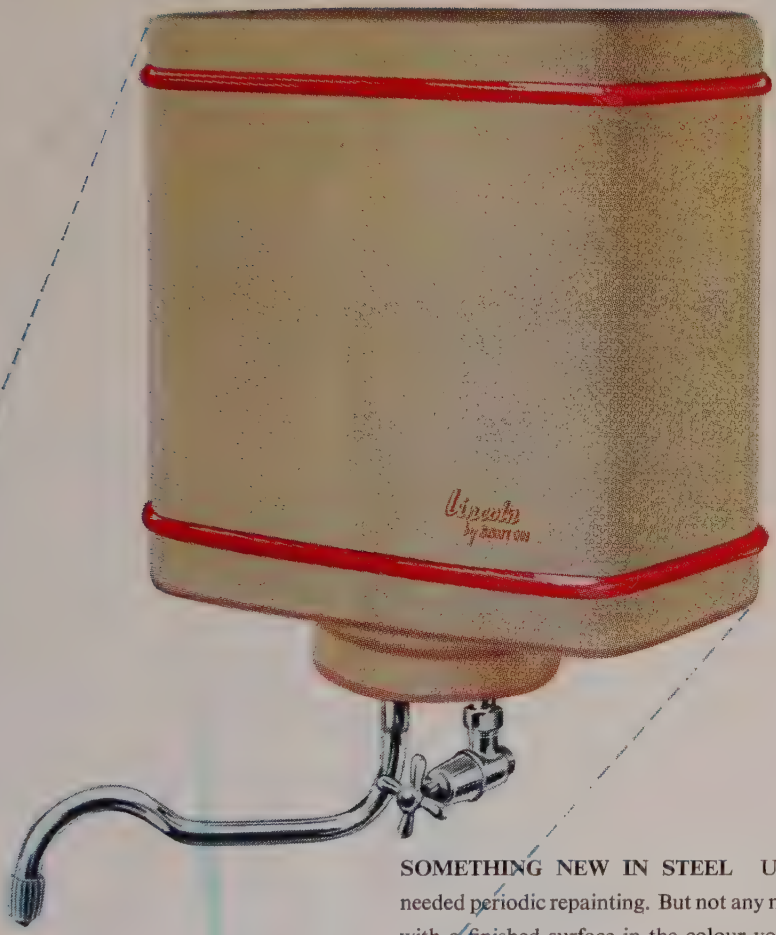
Telephone: CRAWLEY 25955 (5 lines)

Our range of Electrical Insulation includes Natural Mica - Built up Mica Products - Commutator Micanite - Vee Rings - Lantex Laminated Tubes - Lantex Laminated Glass Materials - and Filamic Mica Insulation.

Stelvetite-plastic bonded to steel-has put a new face on Santon Water Heaters



SOMETHING NEW IN STEEL Until recently steel always needed periodic repainting. But not any more. Stelvetite even arrives with a finished surface in the colour you choose. *A surface finish which lasts for ever.* Stelvetite's permanent P.V.C. surface resists scratches, acids, detergents and time. Thus no spraying or surfacing is necessary and **Stelvetite can be worked as steel.** Stelvetite comes in a wide range of colours and textures. It is made into doors, partitions, panelling, furniture, kitchen equipment, walls and cladding . . . all of them colourful and permanent. In producton costs alone Stelvetite is a money saver. **Investigate it!**

All enquiries about Santon Water Heaters should be made to:
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Plastic
bonded
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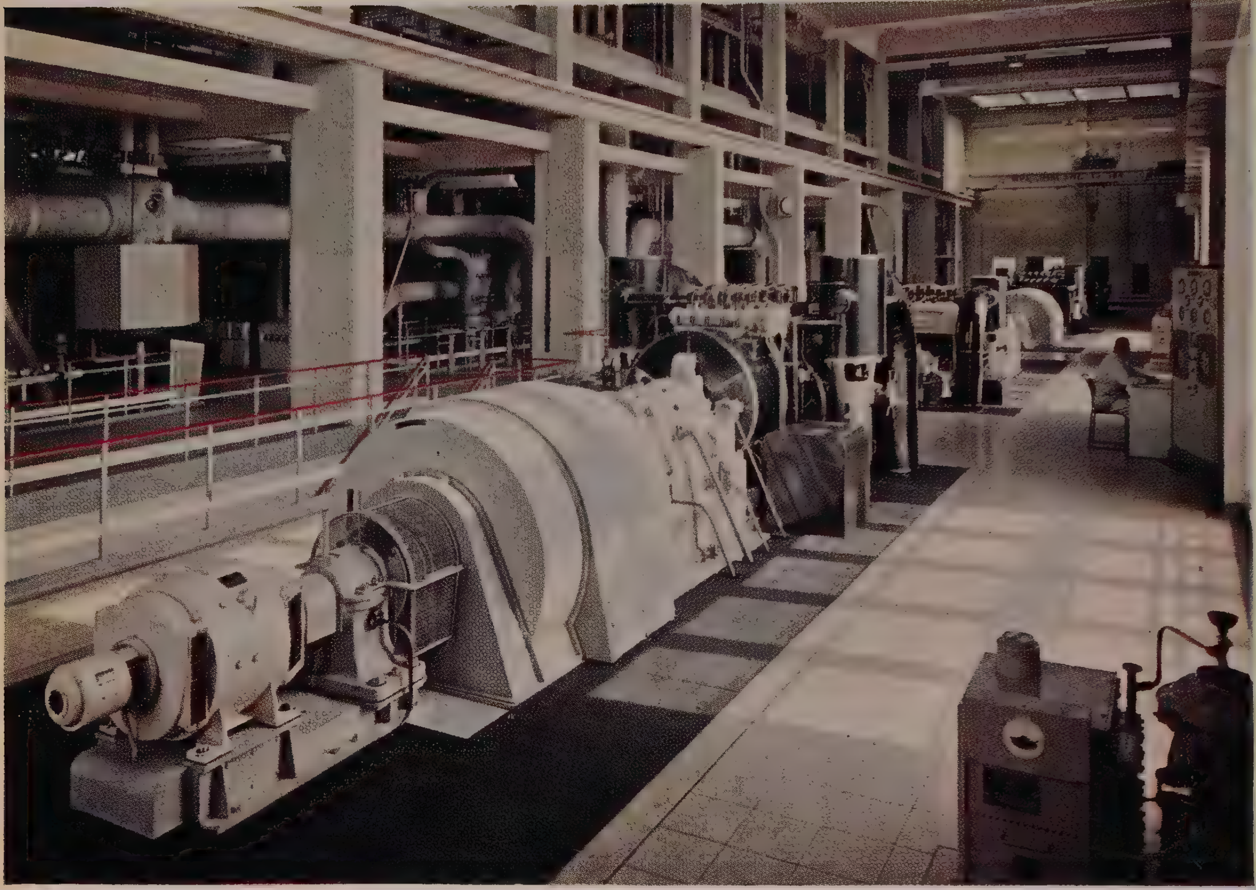
Steel

STELVETITE – made by John Summers & Sons Limited
who produce over 52,000 miles of sheet steel every year
Write to us at Dept. ER., Shotton, Chester. for full information

Power from Process Steam



Two 4520 kW Back-pressure, and two 2500 kW Extraction Back-pressure turbine-generators are installed at the Merseyside Power Station of Lever Brothers, Port Sunlight, Ltd. They are driven by the steam generated for process work and, operating in parallel with the National Grid, provide the electricity for the factory, helping to minimise overall fuel costs.

Extensive experience in the design and manufacture of extraction and back-pressure turbines enables AEI to advise on applications in your particular industry. For further details write to AEI Turbine-Generator Division, Rugby, Warwickshire, or your local AEI office.

AEI TURBINE-GENERATOR DIVISION,

Associated Electrical Industries Limited

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0 amp Switches with Pilot Lights

'avoured by consumers for the reliable Pilot Light re, these 20 amp switches by WYLEX are designed by neers familiar with electricians' problems.

The modern-styled, moulded cover, conceals the secret eir success—the original WYLEX switch, proven by of extensive service. Special features include:- silver-to- contacts, robust mouldings, sturdy mechanical com- nts, *and the extra WYLEX quality that costs you no more.*

VYLEX 20 amp switches (DP/AC) with Pilot Light are ble Surface or All-Insulated in Brown or Ivory. Also or without Pattress (enables compliance with I.E.E. ation 207G). Also Flush with All-Insulated cover and ce Metalclad.

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Wylex build quality into . . .

COOKER UNITS · SWITCH FUSE
CONTROL UNITS · SPUR BOXES ·
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SMOOTH FLEXIBILITY . .

IS NEEDED IN SMALL CABLES. You have it in RIST'S flexible cables and cords.

What is more, the smooth flexibility of RIST'S production ensures a full range of cables and CABLE ASSEMBLIES made to your requirements.

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Save stand-by battery space with the new **CHLORIDE** Stationary Cell

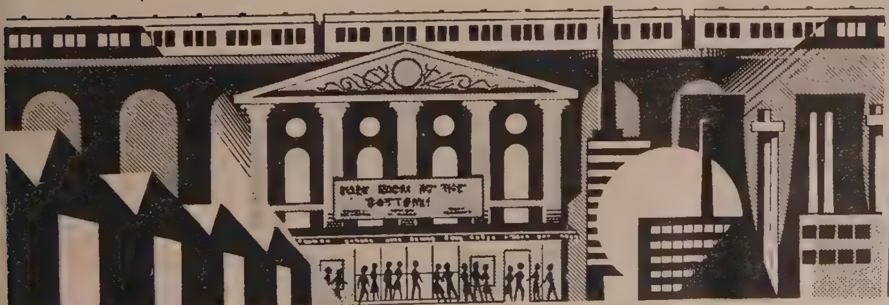
This light, robust cell, with its Planté positive and pasted negative plates, Porvic microporous separators and many other improvements in material and design, saves up to 50% of previously necessary battery space—yet performs its duties with greater efficiency and complete reliability. Specially designed for stand-by duties entailing discharge rates between, say, the 3-hour and the very high rates demanded for switch-closing purposes, it is ideal for trickle-charge operation and has all the remarkable length of life associated with the Planté type of construction.

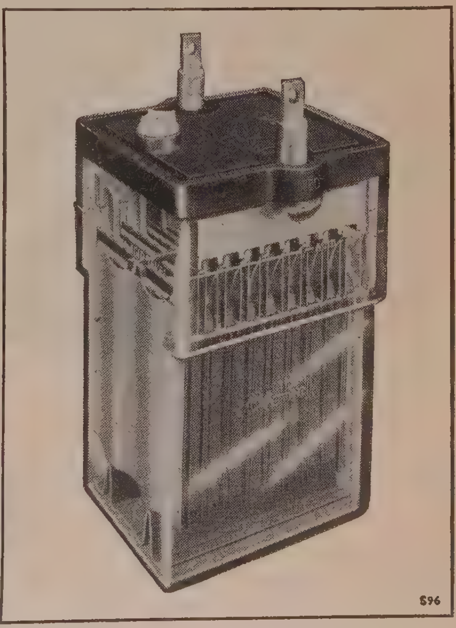
The field in which the new cell is designed to replace current Planté types is a very wide one. Emergency lighting*, switch operation and emergency supply in hospitals, theatres, cinemas and other public buildings, nuclear and conventional power stations, all rely on trickle-charged batteries. In Great Britain today such batteries occupy millions of cubic feet of valuable space. The new Chloride cell could free almost half of it.

*The new cell will from now onwards be fitted in all Keepalite units—the Chloride Company's automatic emergency lighting system.

A PRODUCT OF CHLORIDE BATTERIES LIMITED
BACKED BY WORLD-WIDE SERVICE

Makers of Exide Batteries





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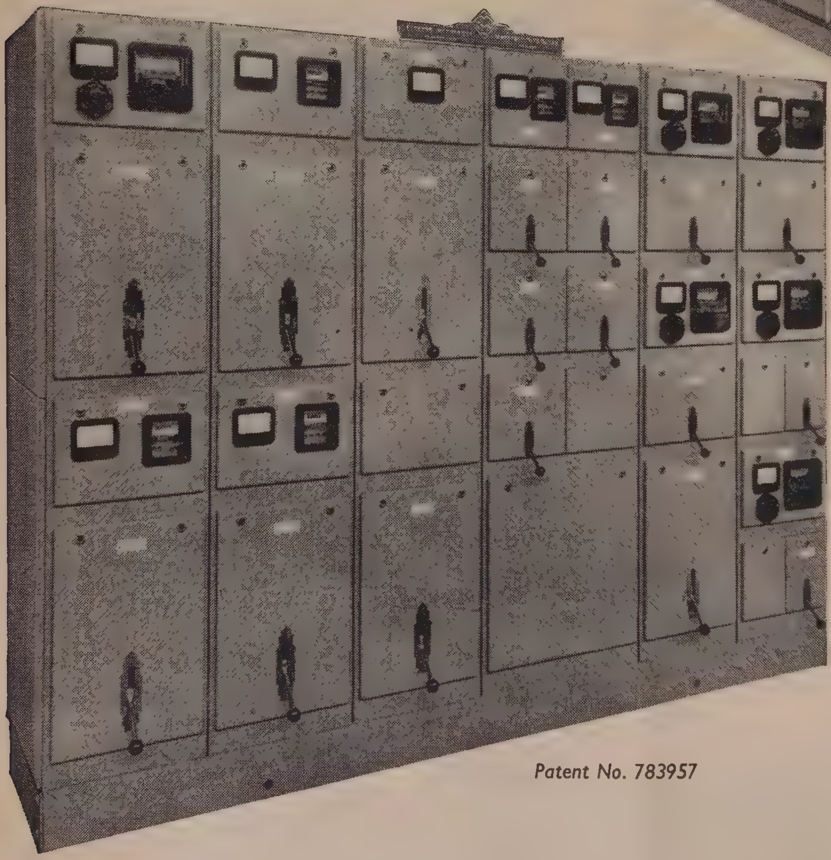
Enquiries to: London, Elgar 7991; Bristol 64086; West Bromwich 2361; Leeds 20248; Glasgow, Bridgeton 3734; Manchester, Blackfriars 1158; Belfast 27953

UNIT AND CUBICLE CONSTRUCTION
SWITCHBOARDS

Illustration on right shows an indoor totally enclosed unit construction type "Y" switchboard with incoming duplicate busbars feeding common outgoing circuits by means of interlocked fused switches of both 300 amp and 500 amp capacity.

Illustration below shows an indoor all-isolating cubicle construction switchboard having individual metering on the outgoing fused switches of 60 amp, 160 amp and 300 amp capacity.



Patent No. 783957

We specialise in building switchboards to your exact requirements with facilities for extension. Designed to give unfailing service under the most onerous climatic conditions whether installed indoors or out of doors.

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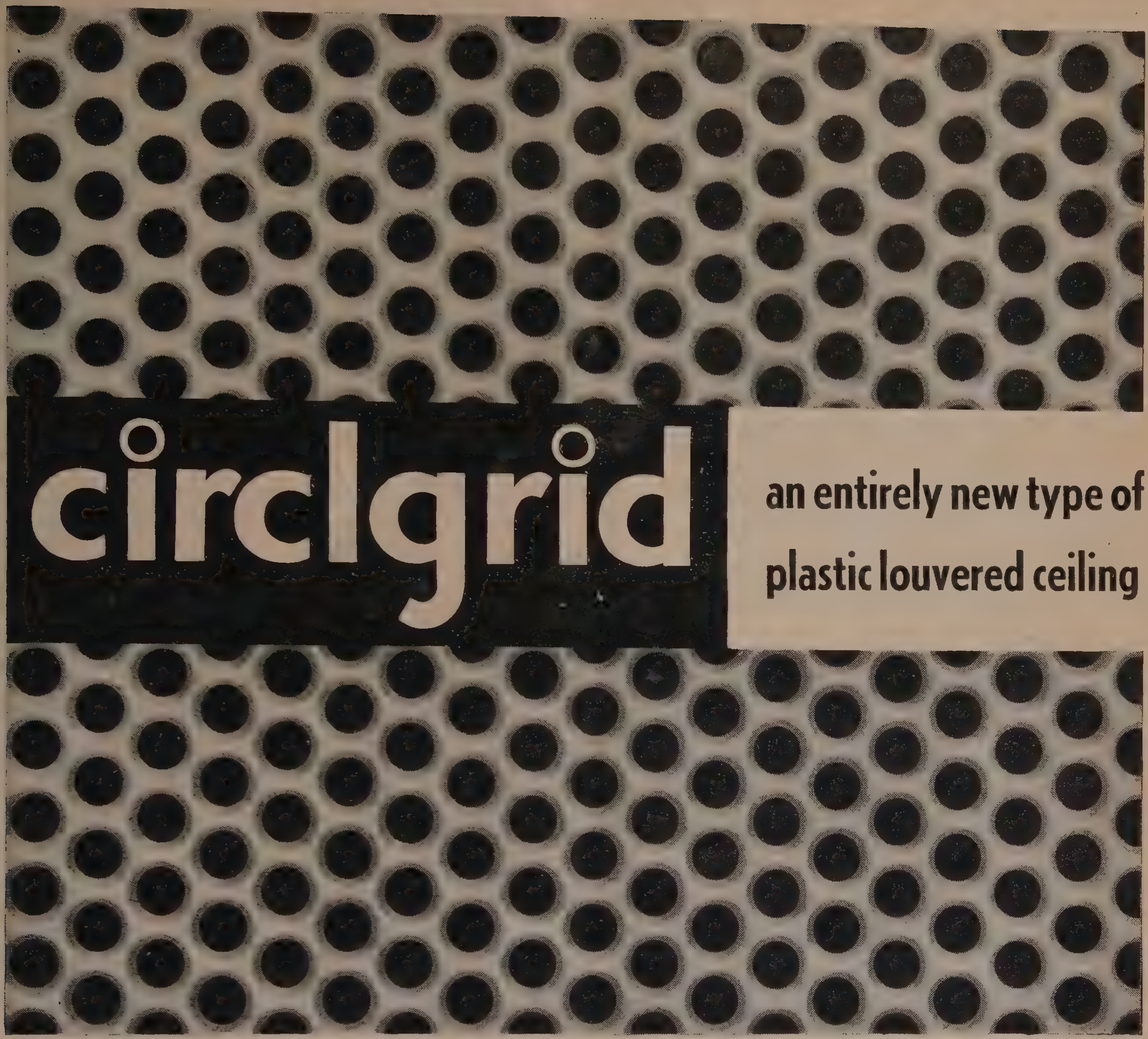
Subsidiary of Yorkshire Switchgear and Eng. Co. Ltd., Leeds



- NON-FLAMMABLE — it is made of P.V.C.
- RIGID AND LIGHTWEIGHT — less than 3½ oz per square foot
- SIMPLE TO INSTALL — it consists of 2 ft x 2 ft panels held in a light aluminium frame
- ELEGANT IN APPEARANCE — the circular louver cells give it a unique surface texture
- GIVES EXCELLENT LIGHT CONTROL — the design of the louver cells permits low surface brightness with a high overall efficiency

Tiles are vacuum-formed from three P.V.C. sheets electronically sealed to make a rigid structure. Three finishes are available

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CIRCLGRID IS ONE OF MANY HARRIS AND SHELDON SYSTEMS WHICH ARE SOLVING EVERY TYPE OF LIGHTING PROBLEM

**FULL DETAILS
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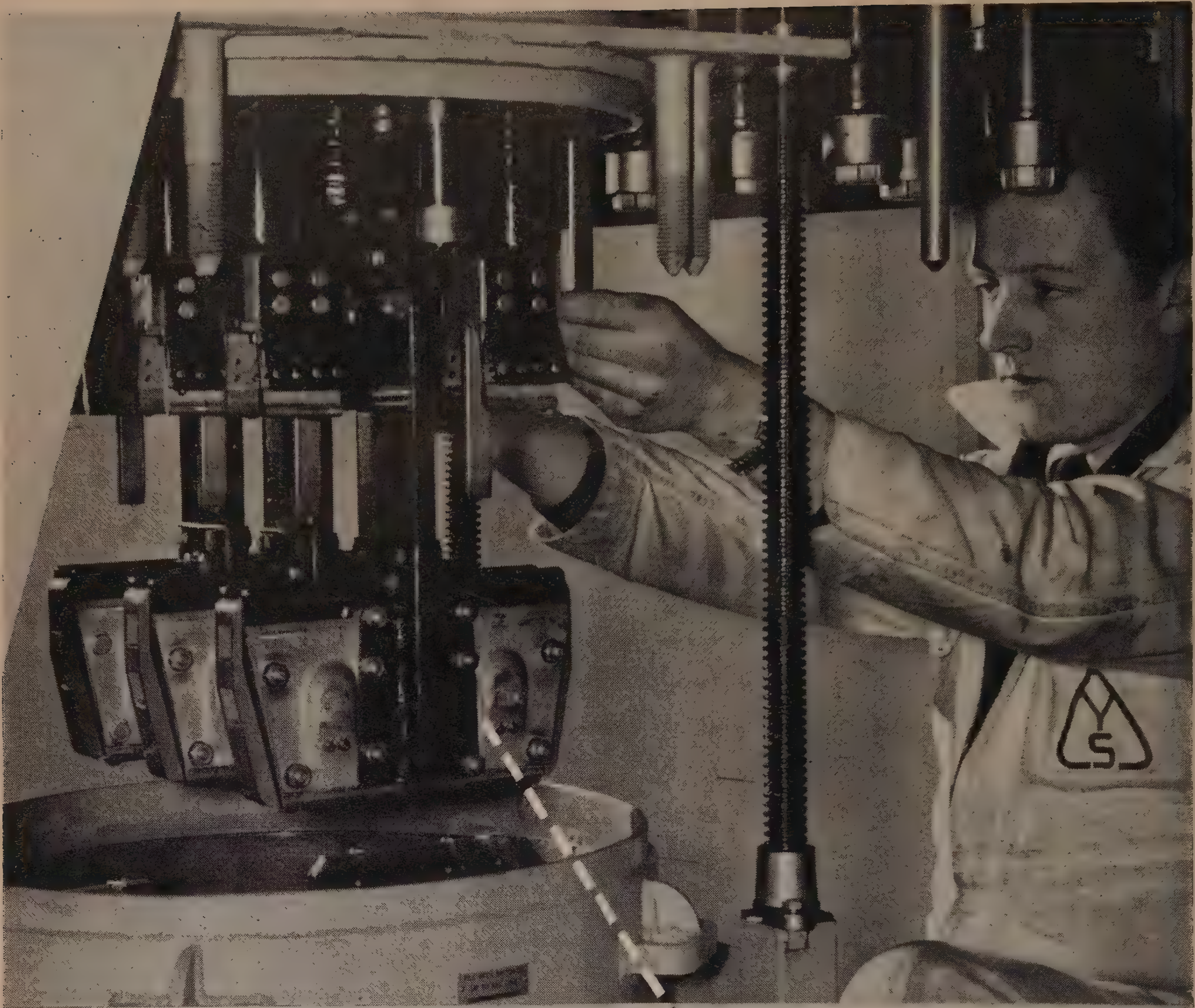
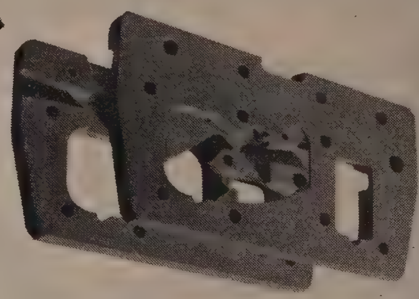


By courtesy of Yorkshire Switchgear and Engineering Co. Ltd.



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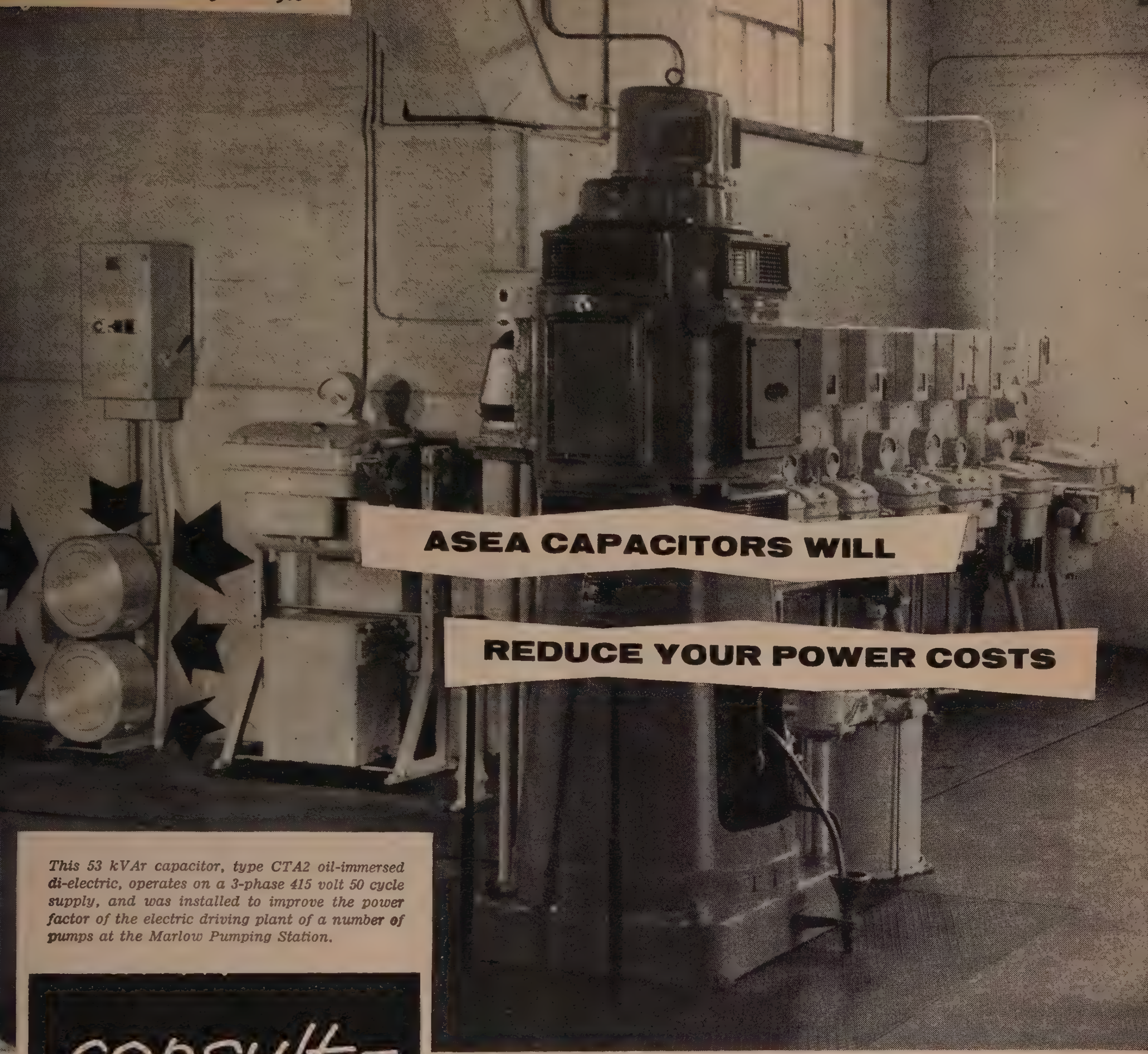

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This 53 kVAr capacitor, type CTA2 oil-immersed di-electric, operates on a 3-phase 415 volt 50 cycle supply, and was installed to improve the power factor of the electric driving plant of a number of pumps at the Marlow Pumping Station.

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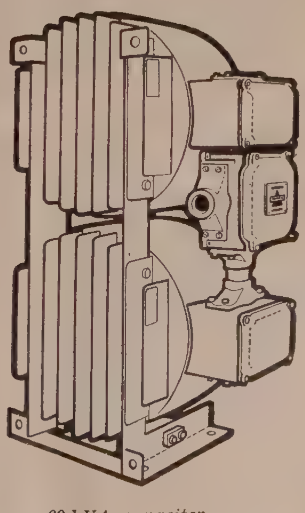

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Are you sure that the highest possible proportion of the current you consume is converted into useful energy? ASEA Capacitors are an inexpensive method of improving power factor and achieving maximum economy. As with most capacitors, the efficiency exceeds 99.7%, but by using a cellulose base paper, *this efficiency is maintained in ASEA Capacitors* at almost all temperature conditions. This feature, coupled with the unique container design, gives ASEA Capacitors a long and trouble-free life.
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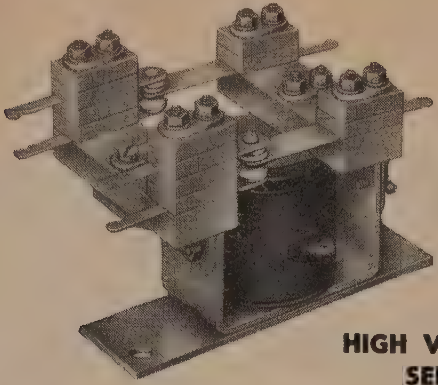
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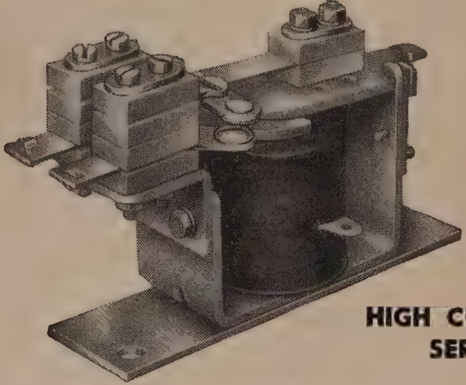
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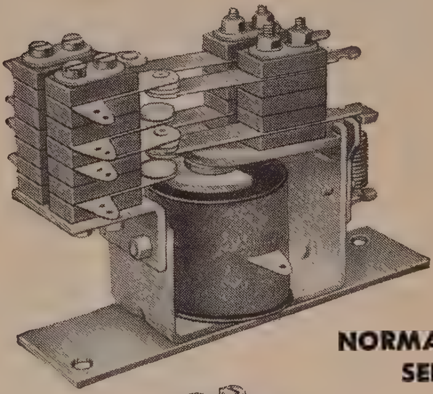
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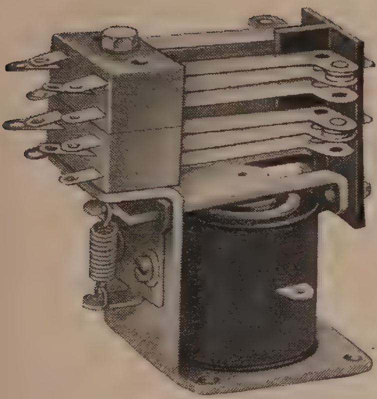
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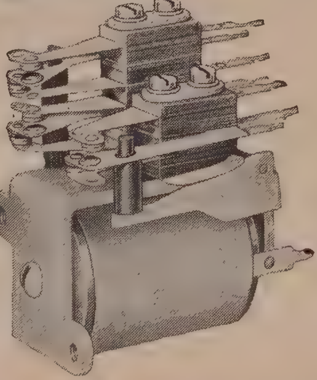
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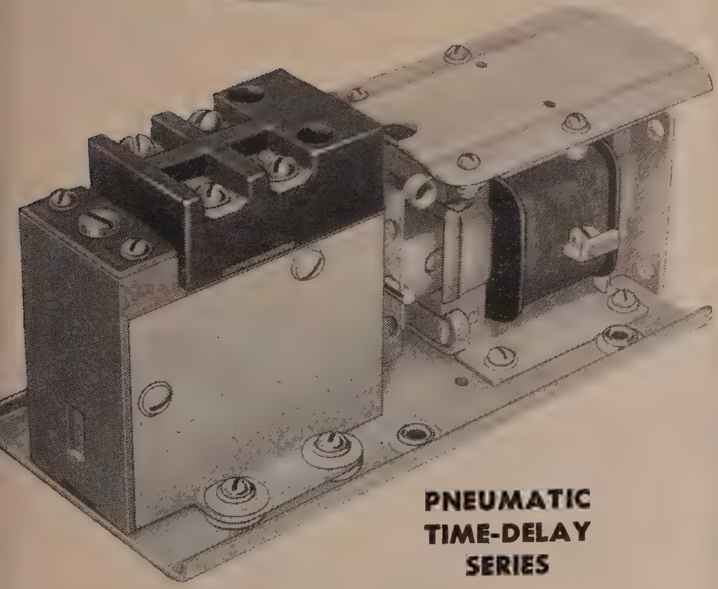
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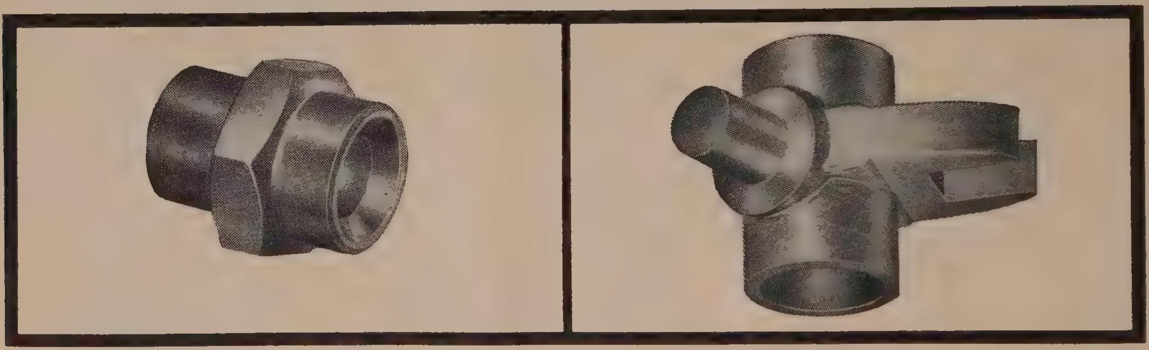

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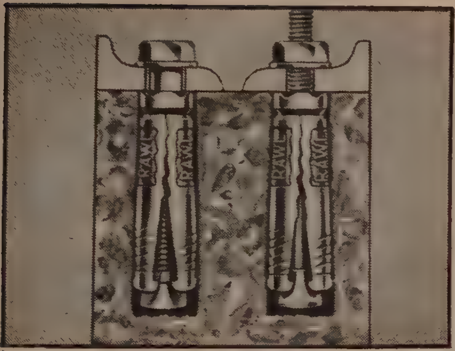
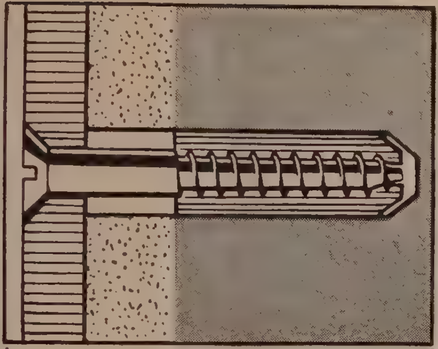
A comprehensive catalogue showing these fixings in detail, together with their application, will gladly be forwarded to you on request.



BOLT FIXINGS

With **RAWLBOLTS** a bolt fixing job is done in minutes, as against days by earlier methods. Simply drill the hole, drop in the **RAWLBOLT**, put into place the unit to be held, tighten up and the **RAWLBOLT** is ready to take the maximum load that the bolt, or the material into which it is fixed, will stand.

For extremely wet or corrosive locations, use Rawlplug Caulking **BOLT ANCHORS**; for securing metal threads in masonry—**RAWLTAMPS**. Where fixing points can be predetermined before pouring concrete, use **CEMENT-IN SOCKETS**, thus obviating the need for hole-boring.



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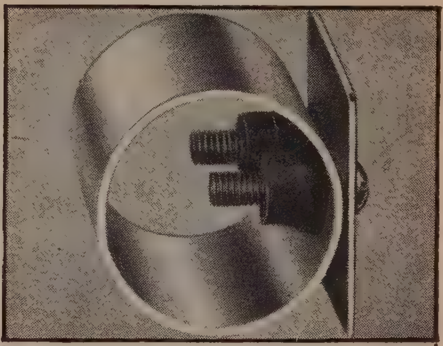
For making neat, absolutely firm screw fixings in masonry, indoors or out, the famous **RAWLPLUG** is still vastly quicker and more efficient than any alternative method. Rawlplugs are waterproof and quite unaffected by climatic conditions. They are available for all screw sizes up to ¾″ diameter Coach Screws.

For fixings that are to be subjected to high temperatures, or in under-water conditions, use **WHITE BRONZE PLUGS** with stainless steel or cadmium plated steel screws. For fixings subject to corrosive fumes or liquids, use Rawlplug **LEAD SCREW ANCHORS** with stainless steel screws.



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The **RAWLNUT**—an ingenious device for fixing into any hollow materials. Inserted and fixed from the outside, it forms its own anchorage within the cavity; and provides a vibration-proof, watertight and **AIRTIGHT** fixing. In addition a type can be supplied to give adequate protection to the screw **IN THE CAVITY**.

SPRING TOGGLES make firm fixings in thin and structurally weak materials such as plasterboard, ceilings, etc. The wings of the device spring apart behind the material and spread the load. **GRAVITY TOGGLES**, for use in hollow wall materials, position their toggles by the action of gravity.

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FIXING DEVICES

and an all-inclusive range of high performance hole-boring tools, hand or power.

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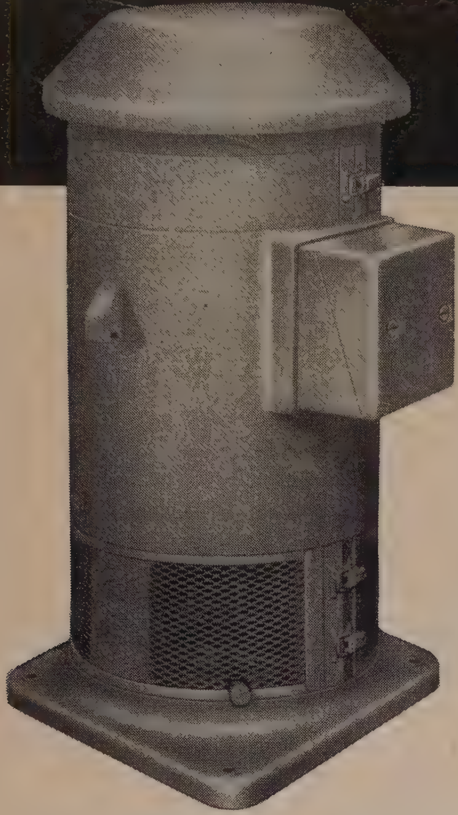
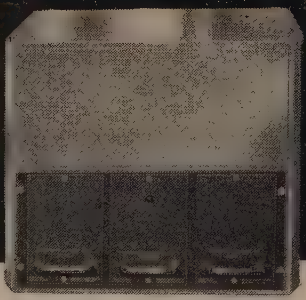
B

Compact Vertical 400 c/s Power Packs now range from 2·5 KVA to 30 KVA





SPACE-SAVING & READILY PORTABLE

Specially designed for equipment and systems requiring a highly stable 400 c/s supply, Vernon vertical power packs now offer outputs of up to 30 KVA, and a refined design so that each unit occupies even less space. The 30 KVA machine is only 55½″ high, with a base 20″ wide. No special mountings are needed and each unit is supplied with compact wall-mounted control gear.

The machines are manufactured to B.S. 2613/57 with Class 'E' insulation and are controlled by Vernon transistorized voltage regulators, giving better than ±1% voltage regulation, and very fast recovery times.

Machines of 10 KVA and above are brushless.

The alternator design ensures a good waveform with a high resistance to non-linear loads, making it particularly suitable for radar supplies. Low slip (2%) squirrel cage motors are generally employed, but synchronous motors can be used in certain instances.

Ward-Leonard sets are also available in vertical form.

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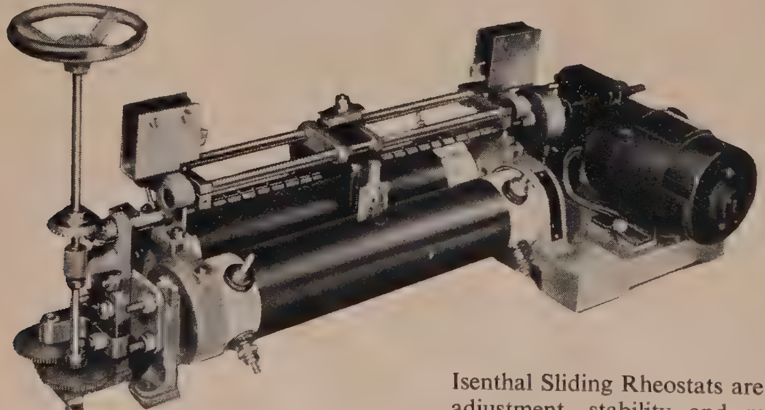

Isenthal Sliding Rheostats are unsurpassed for their smoothness of adjustment, stability and mechanical strength. They are all electrically self cleaning and conservatively rated and the tube terminal stems are firmly locked in their mountings. Straight and graded windings in a wide range of ohmic values and current carrying capacities are obtainable and special characteristic windings can be supplied.

The motor driven rheostat illustrated here is just one of the wide range manufactured by Isenthal.

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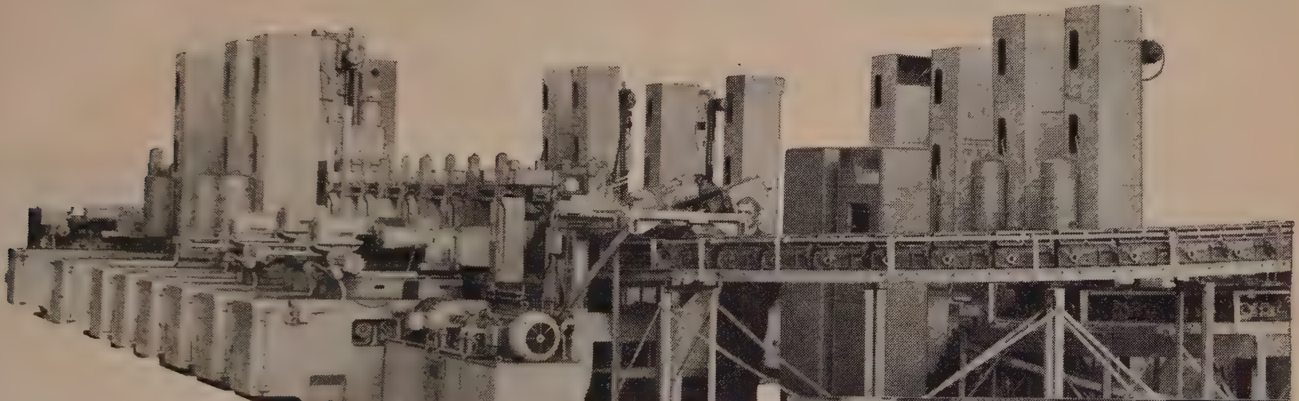

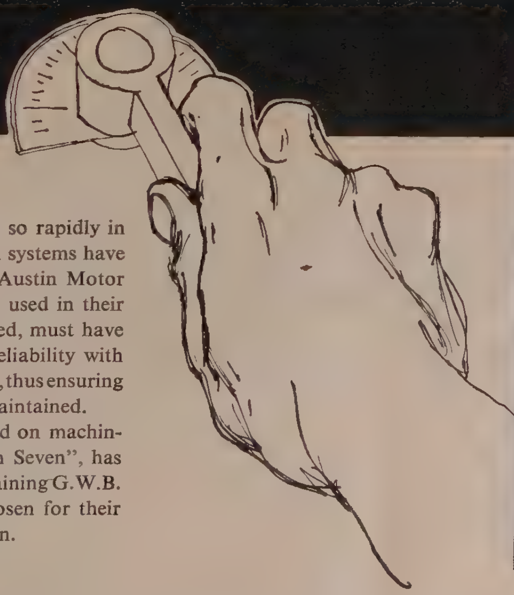

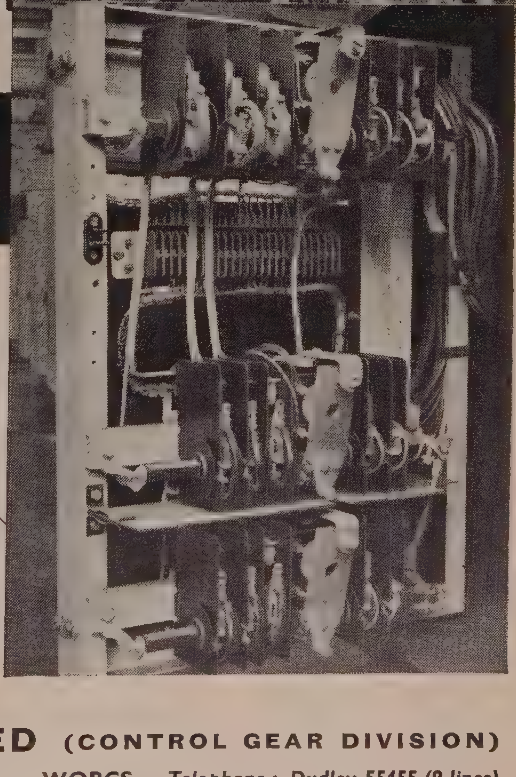

Transfer machines have developed so rapidly in the past few years that their control systems have become exceedingly complex. The Austin Motor Co., Ltd., specify that control gear used in their transfer lines, such as that illustrated, must have the highest possible standard of reliability with the minimum servicing requirements, thus ensuring that production programmes are maintained.
Every unit head in this line, engaged on machining cylinder blocks for the "Austin Seven", has its own standard control panel containing G.W.B. 50V D.C. operated contactors, chosen for their efficiency and reliability in operation.

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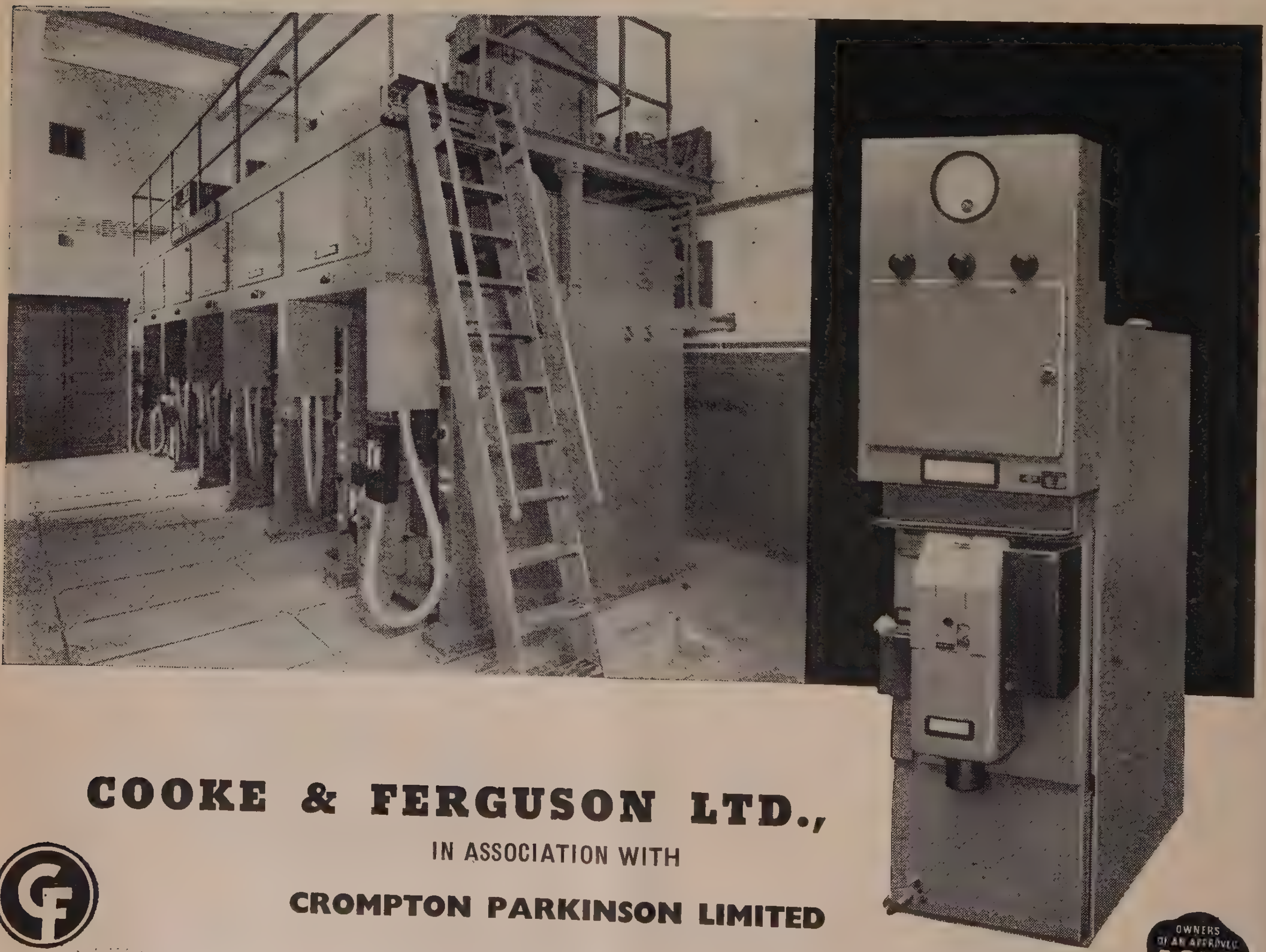

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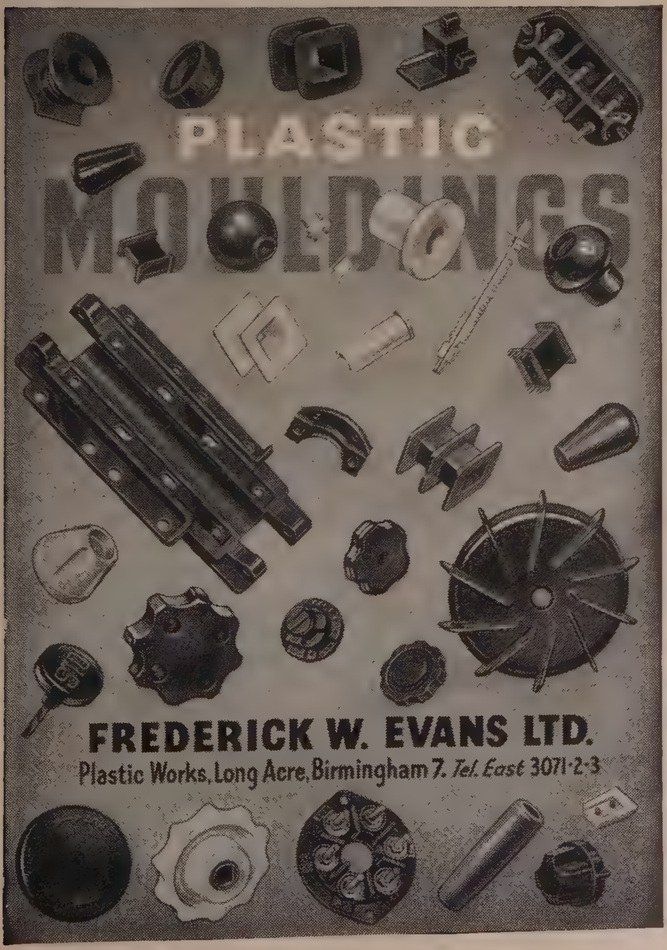

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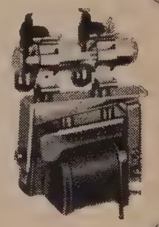
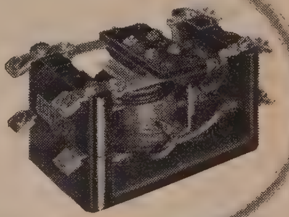


MOL

A small relay with moulded base and insulators. Contacts up to 3 amps. T.P.D.T. Coils up to 165v D.C. or 450v A.C.



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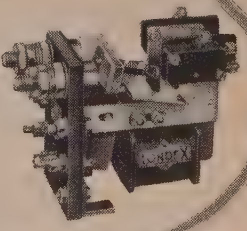
A heavy current contactor for low voltage switching. Rating up to 100A at 24v. S.P.S.T. Coils up to 250v D.C. or 600v A.C.



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flange mounting geared motors

All NECO co-axial geared motors can be supplied with flange mounting instead of feet to enable the unit to be bolted accurately to your machine.

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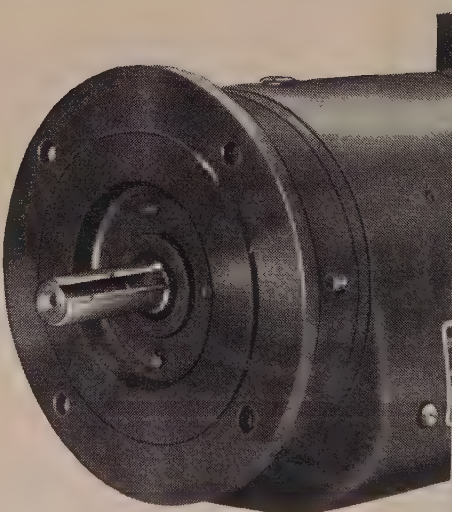
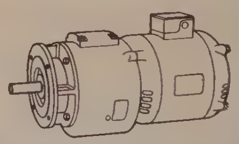
Up to 1/2 h.p. input or up to 100 lb.ft. output torque. 0.5 to 475 r.p.m. 8" diameter flange. Removable feet can be supplied with this unit.



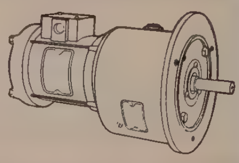
TYPE HD

Up to 2 h.p. output
or up to 200 lb.ft
output torque.
0.62 to 480 r.p.m.
8″ diameter flange.



TYPE 25

Up to 1/8 h.p. input
or up to 25 lb.ft.
output torque.
0.079 to 312 r.p.m.
8″ diameter flange.



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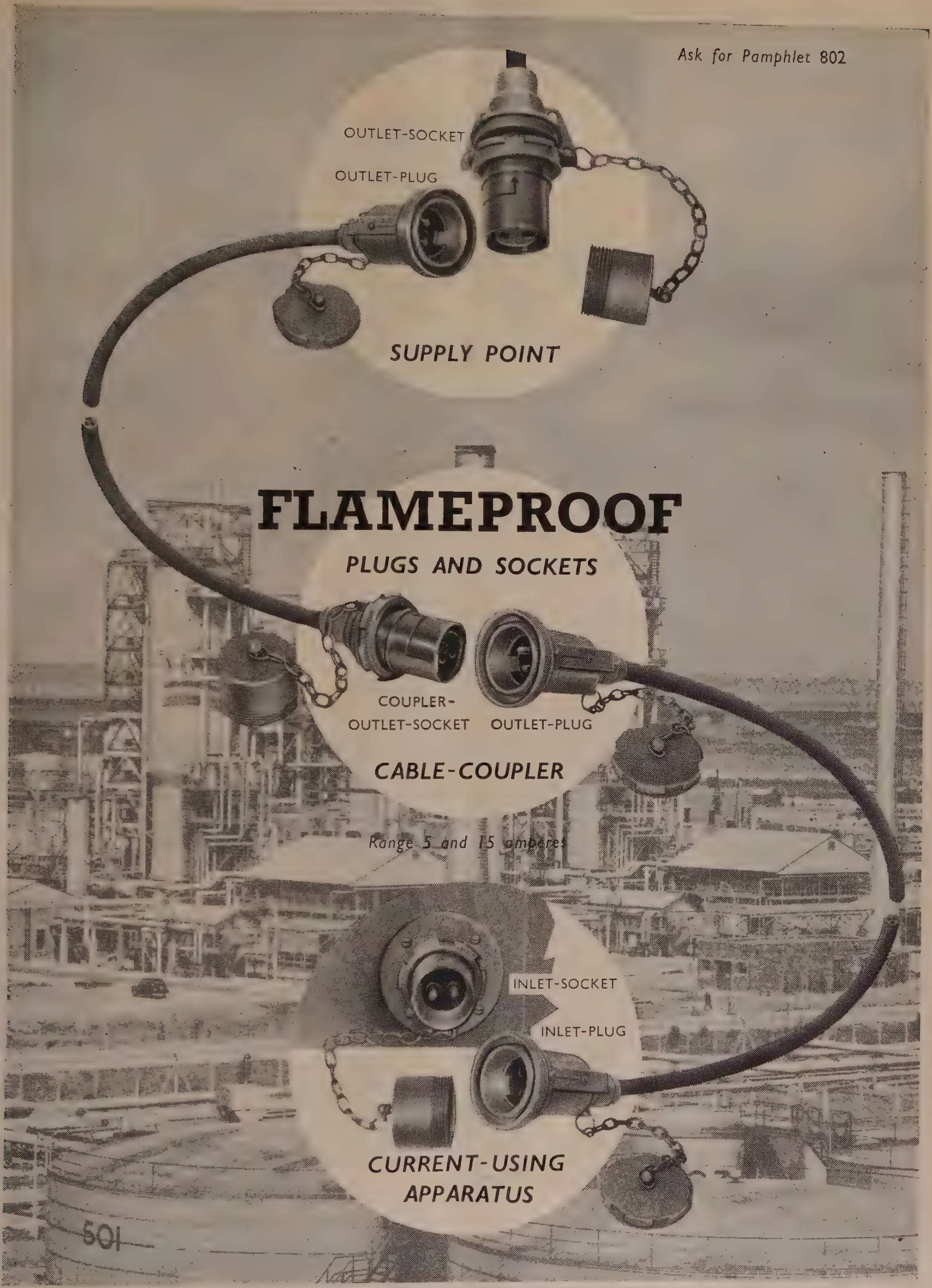

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This new Catalogue presents in a clear and compact form full technical information to assist in the selection of the correct contact material and will prove an invaluable reference to all users of precious metal contacts. The catalogue has four sections under the following headings :

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Chemical and Metallurgical considerations
STANDARD FORMS
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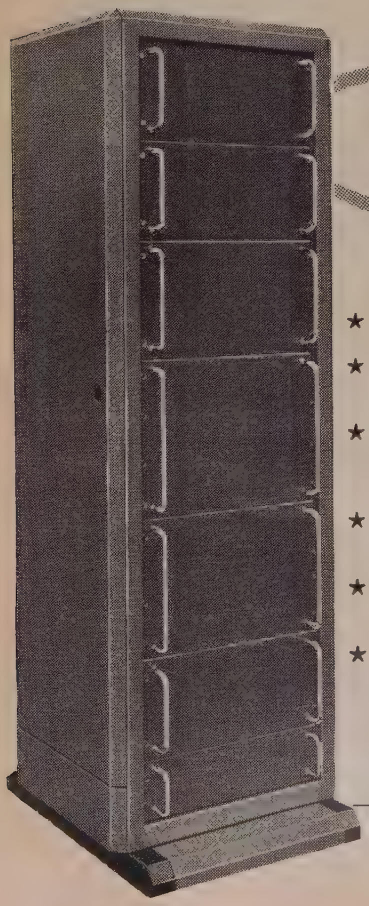

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In the finest quality zinc-coated steels and finished in high-relief hammer stove enamel; other finishes available to your own particular specification.

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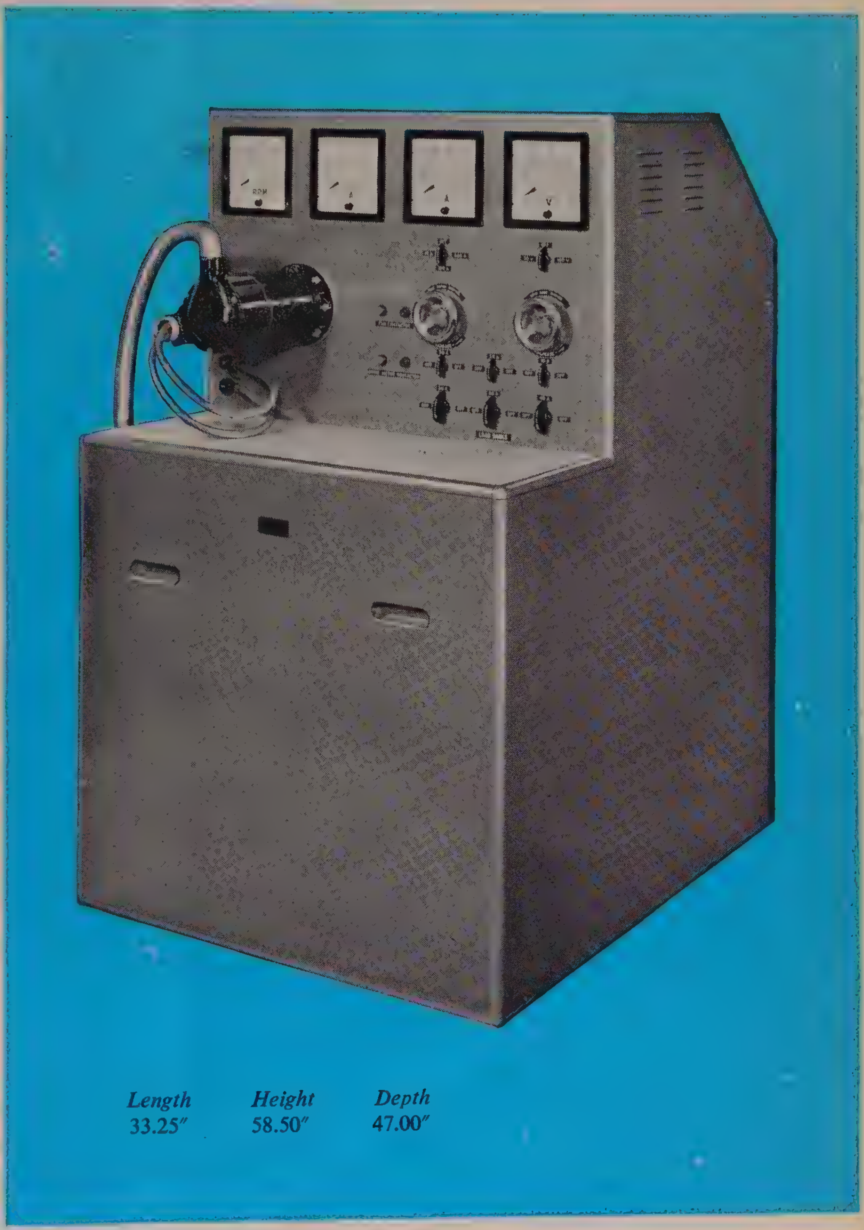
ROTAX TEST STAND FOR A.C. AND D.C. GENERATORS



Length 33.25″ *Height* 58.50″ *Depth* 47.00″

The test stand shown gives precision test results on alternators up to 15 kVA, or D.C. generators up to 9 kW, over a speed range of 2,500 to 10,000 r.p.m. It can be supplied as a combined unit, with full instrumentation for testing both alternators and generators. With pressure gauges and flow indicators fitted, it is suitable for testing pumps, compressors and other hydraulic units.

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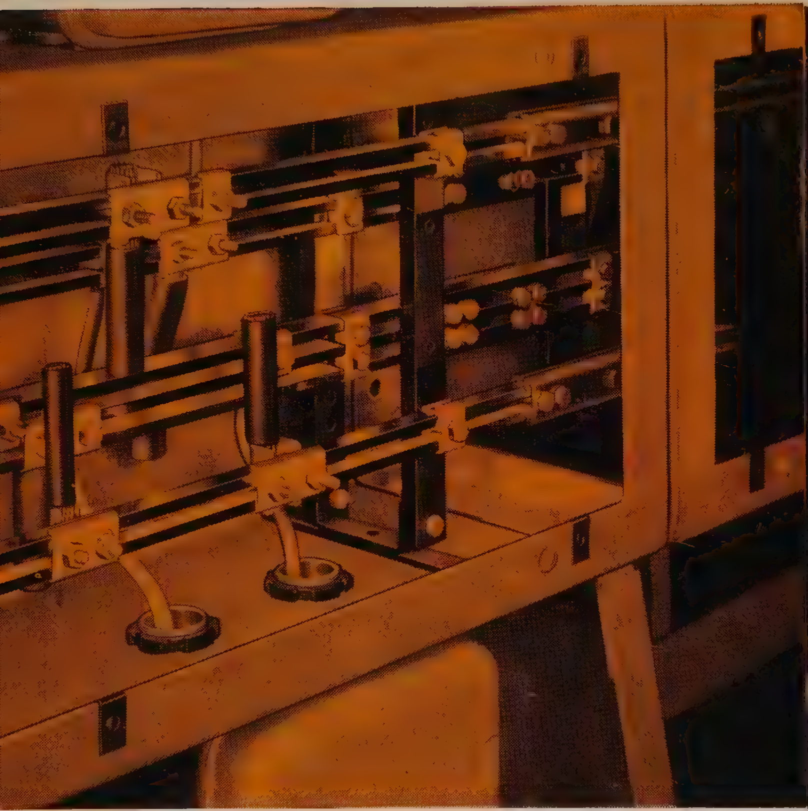
Simplex Star

BUSBAR CHAMBERS WITH STAR FEATURES

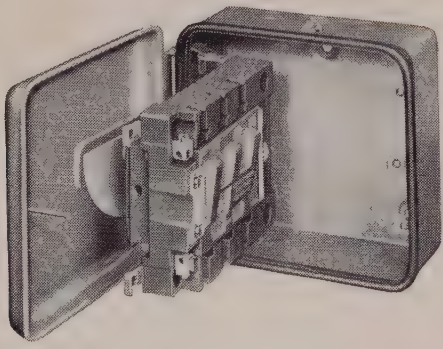


Close up of interior of Star Busbar Chamber howing busbar arrangement, and main and ranch terminals. Cables, deliberately cut way for purpose of illustration, are ·15 and sq. in. sizes.

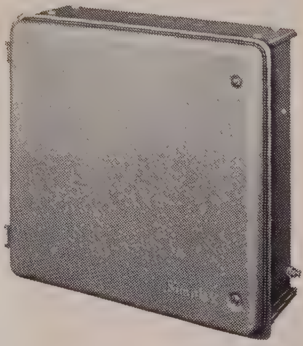
- ★ Smart and modern in appearance.
- ★ Simple and sound common-sense wiring facilities.
- ★ Phase indication.
- ★ Universal clamp connections that require no drilling and no sweating.
- ★ Maximum adaptability of stand assemblies, length of chamber, and polarity.
- ★ Detachable busbar supports that can be repositioned to suit incoming and outgoing feeds.

Send or 'phone for fully descriptive leaflet.

The new Simplex Star range of switchgear has already become big news. Here is an example of advanced thinking, of improved design and modern methods that add a plus to every feature yet a minus to the price.



Star switchfuse with cover open showing interior hinged forward for ease of wiring.



Star distribution fuseboard.

Star switchboard—A team of Sim practical experts will help you designing building and advice on plete Simplex switchboard installat

Busbar Chambers from this brilliant new range of dead-front switchgear with everything plus but the price

The Simplex Star range, simpler, smarter, more easily serviced, is a wide practical range, covering industrial and commercial applications or requirements. Wiring and assembly instructions are enclosed with all units together with list of spares.

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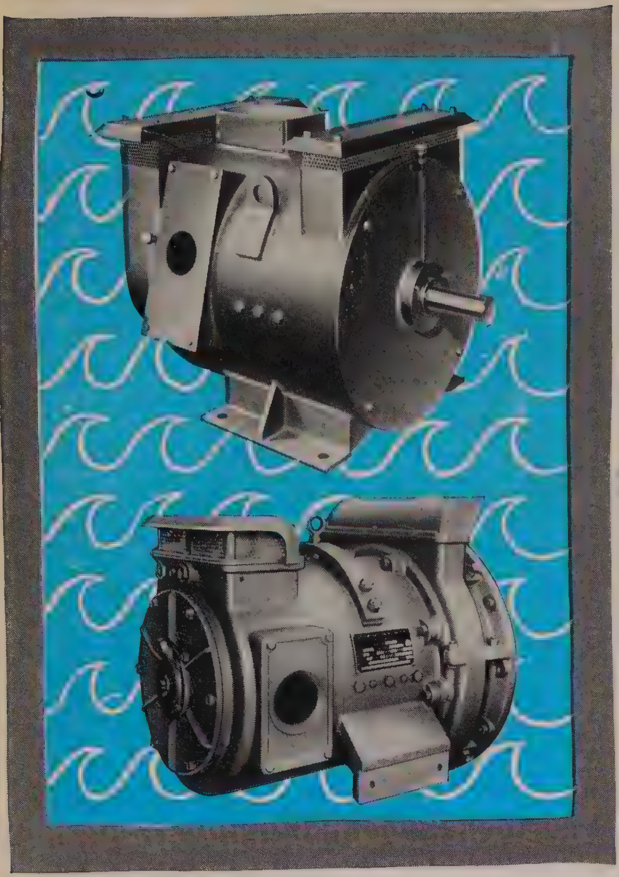

The range of Electro Dynamic equipment gives a designer freedom of choice. He is not tied to a rigid number of production pieces, we manufacture specials as a matter of course.

Illustrated here is equipment especially designed for marine duties, and backed by more than forty years' successful experience in this field.

Motor, generators and starters for all marine purposes are available in standard and special designs.

Power and Control.

Above

60 h.p. 220 v. D.C. Marine Motor, drip-proof enclosure.

40 kW 220 v. D.C. Marine Generator, flange mounted for coupling to diesel engine.

Right

Contactor Starter for D.C. Motors, available for constant and variable speed drives.

Hand-operated Faceplate Starter for D.C. Motors, available for constant and variable speed drives.

E.D.C.C. are manufacturers of:

- Dynamometers
- Rotary convertors
- Flame-proof marine motors
- Frequency changers
- Induction regulators
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- Voltage stabilisers
- Rotary transformers
- Battery traction motors
- D.C. generators
- Magnetic couplings, etc.
- Control gear

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P4755

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"but not WOOTTON METER BOARDS Sir"

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and don't forget WOOTTON wood blocks, sunk switch boxes and instrument cases.

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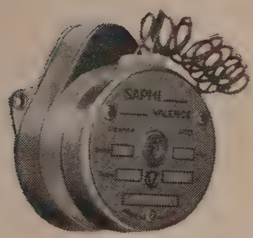
The CROUZET SYNCHRONOUS MOTOR

MOTOR AND REDUCTION UNIT



TYPE 392

A cylindrical motor with centre output shaft.

Ferrite rotor incorporating anti-return device.

The reduction unit is in the form of an ovoid and contains lubricating felts.

Steel pinion and brass gear wheels.

CHARACTERISTICS —

- Final drive shaft—4mm. ⌀ × 10 mm. long.
- Max. torque that can be applied on final drive shaft — 3 kg/cm which is obtained at the speed of 3 r.p.m.
- Two brackets are incorporated into the reduction unit to facilitate the mounting of the unit. ⌀ of fixing holes — 3·2mm.

STAND 861
I.E.A. EXHIBITION
OLYMPIA

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H.31

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assure correct sequence control and increase safety

★ VIRTUALLY UNLIMITED DIFFERS

★ POSITIVE LOCKING

A safety lock, approved by the Central Electricity Generating Board, and backed by 70 years of lock manufacturing experience.

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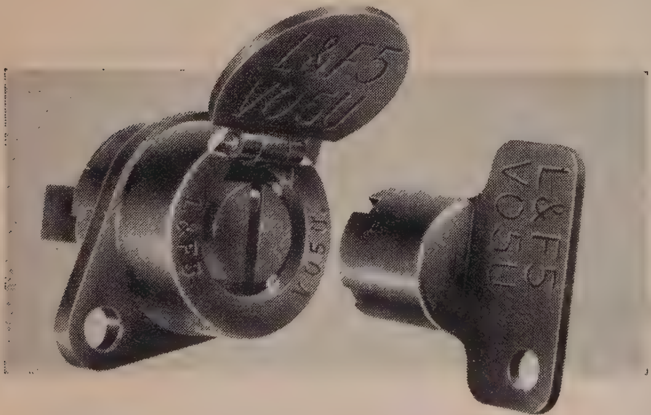
Our service includes the assistance of technical staff whenever and wherever required.



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Grams: Squirrels, WILLENHALL

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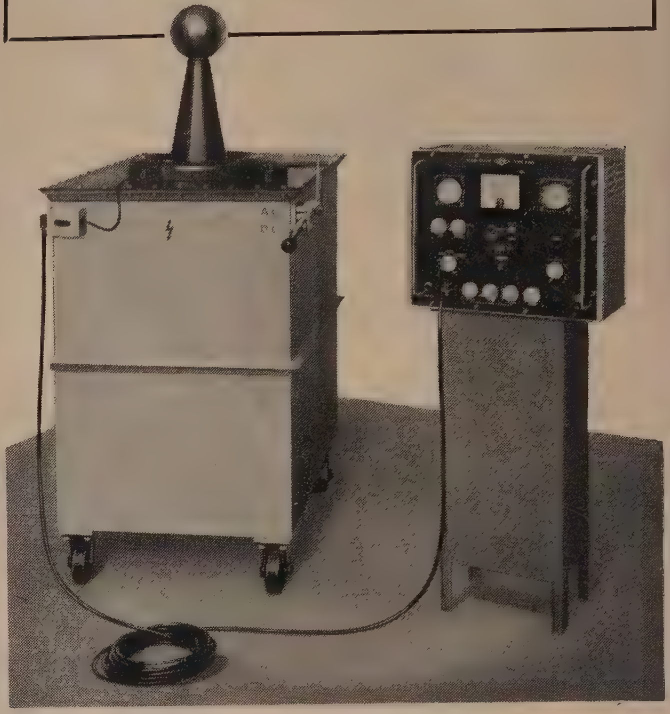

THE AIRMEC FLASH TESTER P.200

gives both visible and audible indication of ionisation and leakage currents

The 100 kV Flash Tester Type P.200 has been designed for comprehensive A.C. and D.C. testing of insulation at very high voltage. It not only provides a heavy current for breakdown purposes but also incorporates sensitive indicators of both ionisation and leakage currents.

E.H.T. UNIT

A continuously variable output voltage of from 0–140 kV peak a.c. at 50 c/s or 0–140 kV d.c. is obtained from an E.H.T. Unit which is housed in a steel, oil filled case mounted on wheels. A control unit, which can be operated at any distance up to 36 feet away from the E.H.T. source, provides a remote control facility to ensure absolute safety.

CONTROL UNIT

The Control Unit contains the voltage controls together with a meter for the measurement of AC or DC output voltages and leakage current. The leakage current may be measured in two ranges, 0–500 microamps and 0–5 milliamps.

VISIBLE AND AUDIBLE INDICATION

A 2¾″ Cathode Ray Tube is incorporated on which either the leakage current or applied voltage waveforms may be presented. An elliptical trace is also provided for the display of ionisation currents. In addition, the presence of ionisation currents is audibly indicated by a loudspeaker.

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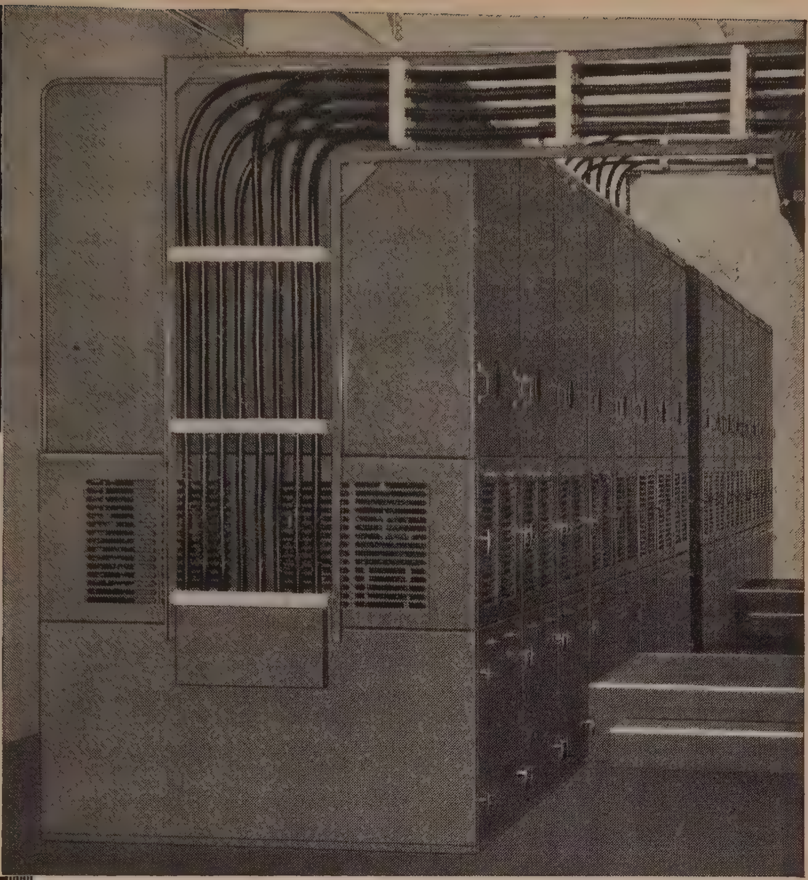
AIRMEC LIMITED - HIGH WYCOMBE - BUCKS

Telephone: High Wycombe 2501/7

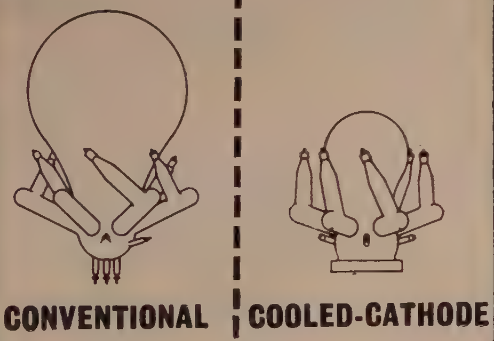
HEWITTIC Cooled-Cathode RECTIFIERS



Increased output -less space

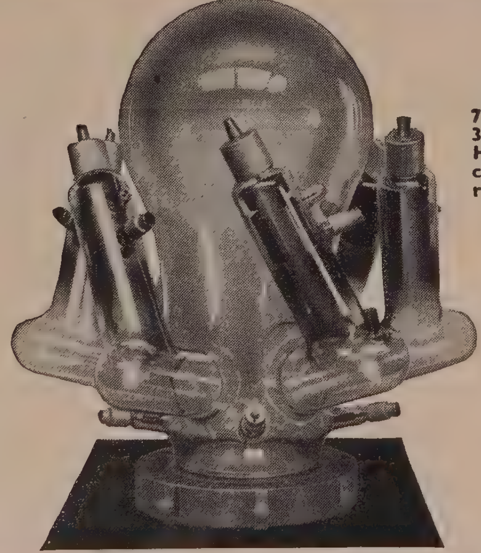
The Hewittic cooled-cathode rectifier is essentially compact and provides a very high capacity within a given floor area.

Right: Two Hewittic cooled-cathode rectifiers forming a 5000 kW bank in the Dover Substation British Railways, Southern Region:



- **Smaller size (see comparison between conventional and cooled-cathode bulbs of same capacity above).**
- **Improved efficiency at lower voltages.**
- **Dependability of bulb maintained.**
- **Ease of installation and maintenance.**

Send for publication R192/1



750 kW 3000 volt Hewittic cooled-cathode rectifier bulb

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WALTON-ON-THAMES - SURREY - ENGLAND

Telephone: Walton-on-Thames 20833 (8 lines) Telegrams & Cables: "Electric, Walton-on-Thames"

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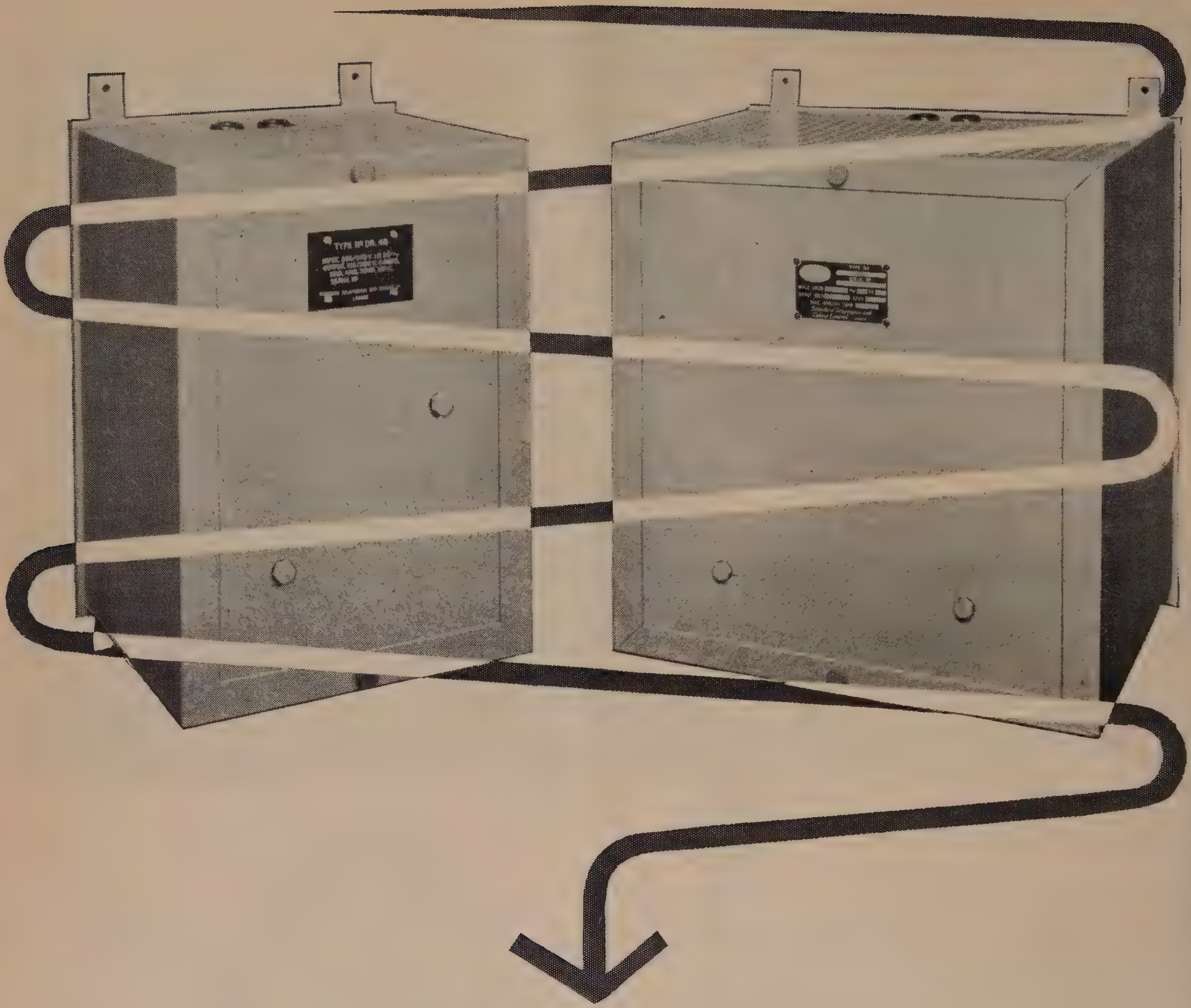

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FOR USE AT MAINS VOLTAGE

Amongst this large range of equipments there is a model for most purposes requiring small to medium power. They are simple, inexpensive, require practically no maintenance, and have substantial inherent overload capacity. There are two general types as follows:

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Input to double wound transformer is from A.C. mains of any normal voltage including either single or three-phase. Output: 88 models are available, with D.C. outputs at 100/120 V., 200/250 V. or 400/460 V. Current ratings of from 0·075 Amp to 84 Amps at an ambient temperature of 30°C.

Typical Applications

D.C. to A.C. Change-over and general D.C. power supplies
D.C. machinery and alternator excitation
Power supplies for D.C. motors
Magnetic Valves
Magnetic chucks and all Electro-Magnetic equipments
D.C. Power Supplies for Control Gear

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Input: Direct to rectifier from A.C. mains of any normal voltage, thus saving the cost of a transformer in cases where the required D.C. output is of the same order of voltage as its A.C. input.

Output: 53 models are available with various D.C. outputs, between 70/90 V. and 495/550 V. Current ratings of from 0·075 Amp to 80 Amps at an ambient temperature of 30°C.

Typical Applications

D.C. machinery and alternator excitation
Magnetic Valves
Magnetic chucks and all Electro-Magnetic equipments
D.C. Power Supplies for Control Gear

Ask for Bulletins F/ATR.1 and F/DR.1.

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"Colne" ISOLATOR SWITCHES

660 v. 60 ampere capacity
A.C. with door interlock
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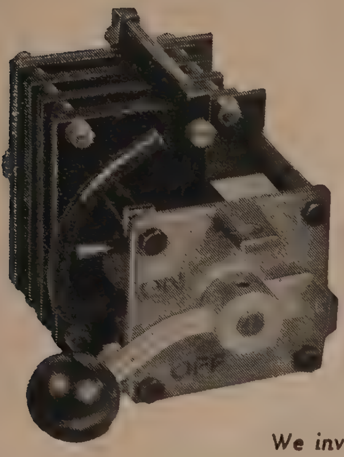

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Full range of colours

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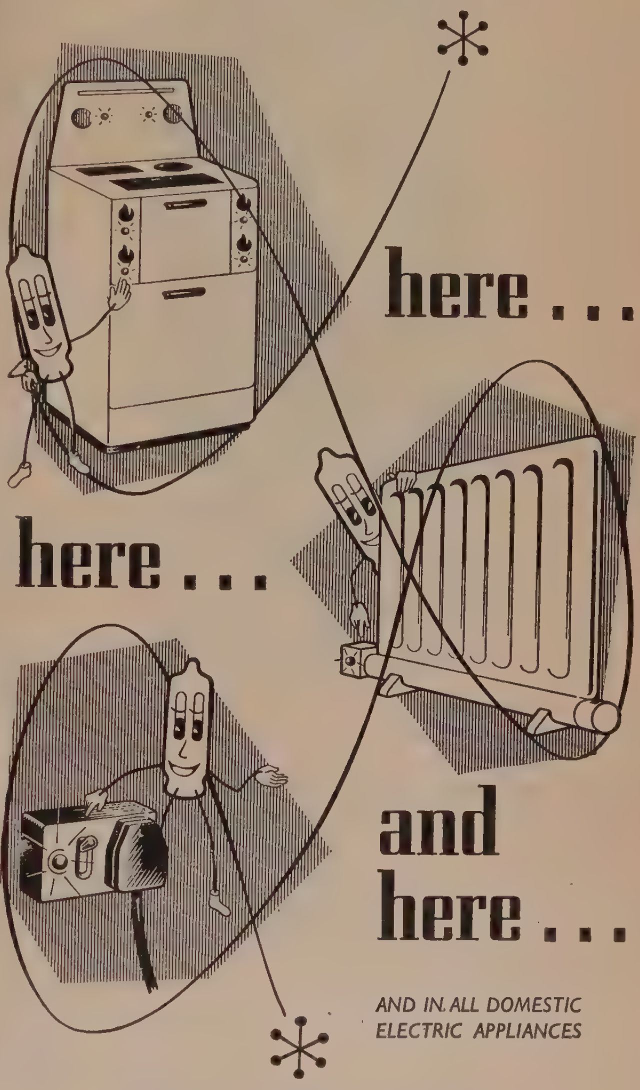

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- Reliable—extremely long life without sudden failure.
- No filament to fracture.
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N4

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Maintenance of level in hoppers, bunkers, vats and tanks is essential if production is to proceed without interruption. To meet the diverse requirements of industry Radiovisor produce a wide range of electronic level control equipments. They are specialists in this field with 30 years of practical experience to guide them.

Conductivity, capacity or photo-electric systems for single or dual level control are available. From this range Radiovisor have solved economically many level control problems. They can also solve yours.

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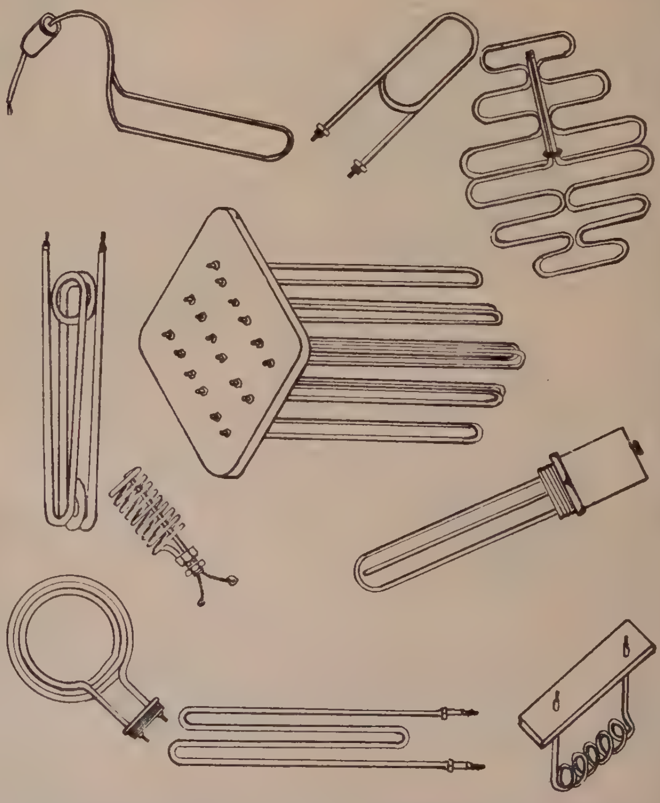

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you can't beat this drum

DECO Cable reeling drums are designed and developed to solve one of the most difficult problems on industrial plant, where the transmission of electrical supply to the moving machinery by means of conductor rails, trolley wires, or loose trailing cables, presents a hazard to life and plant, with consequent loss of production.

The field of application is an extensive one, ranging from small portable machines employing fractional horse power motors to Dredgers and Dock Plant up to 350 H.P.

Manufacturers of Special Electrical Equipment for every class of Handling Plant

Winch Limiting Mechanisms with special quick reset features, Shunts and Ultimate Series Type.
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Hose Reeling Drums, Patent No. 370,076/32 for use with oil, air, water and liquids up to 100 lbs. per sq. in. pressure.
Spring Controlled Cable Drums with alligator clip and retention catch for static discharge when re-fuelling aircraft, tankers, etc.
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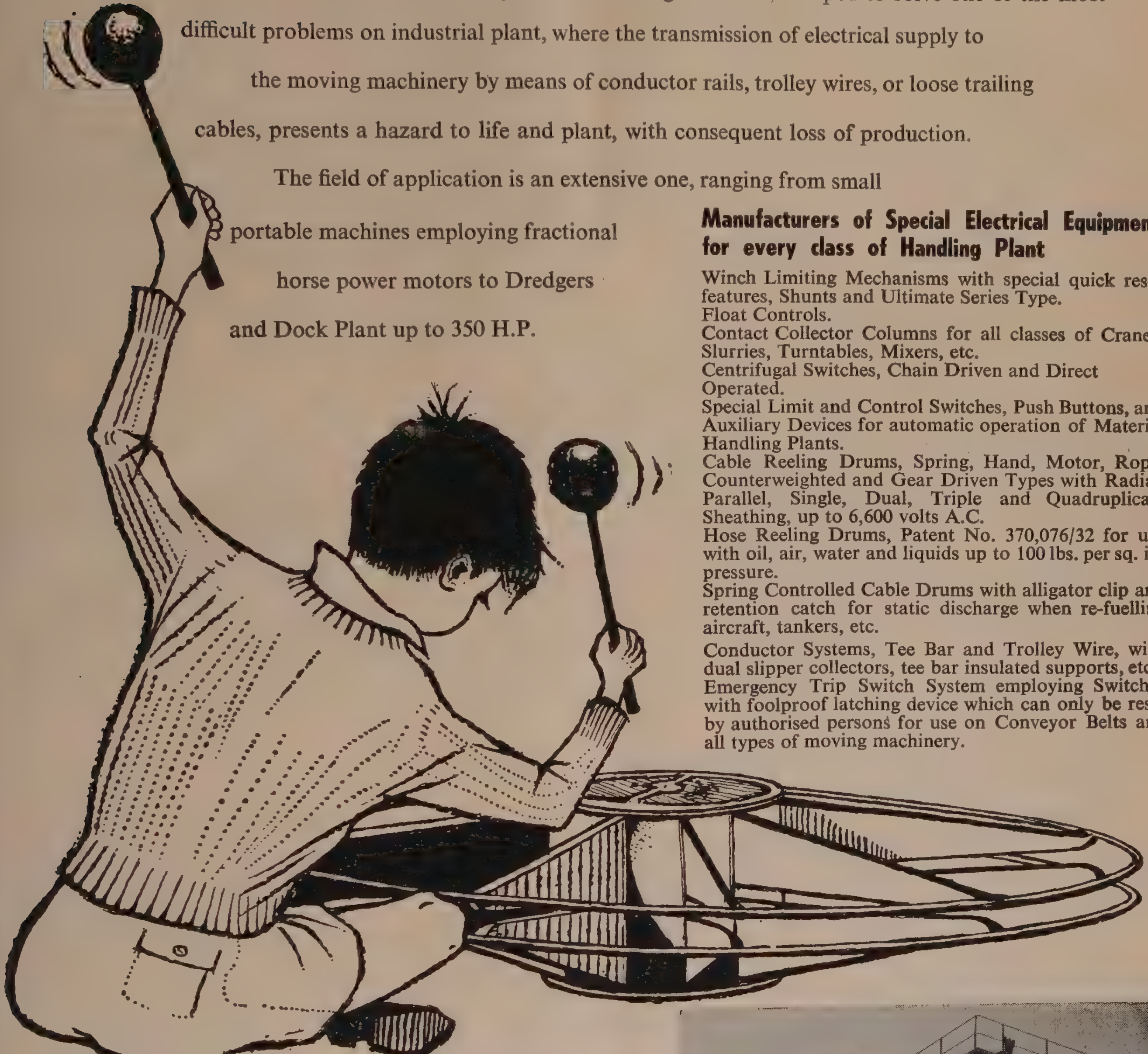
Emergency Trip Switch System employing Switches with foolproof latching device which can only be reset by authorised persons for use on Conveyor Belts and all types of moving machinery.



An illustration of a counter-weight operated radial reeling drum accommodating 130 feet of 4-core 1.3″ overall diameter reinforced trailing cable for a 40-ton Goliath crane. (Photograph by kind permission of Messrs. Stothert & Pitt Ltd.)

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cable reeling drums

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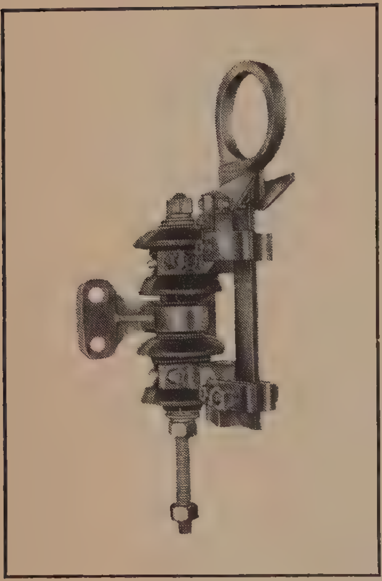

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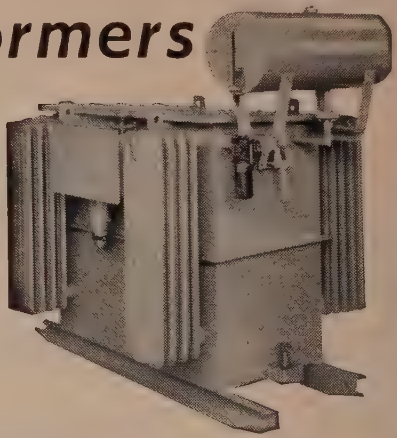

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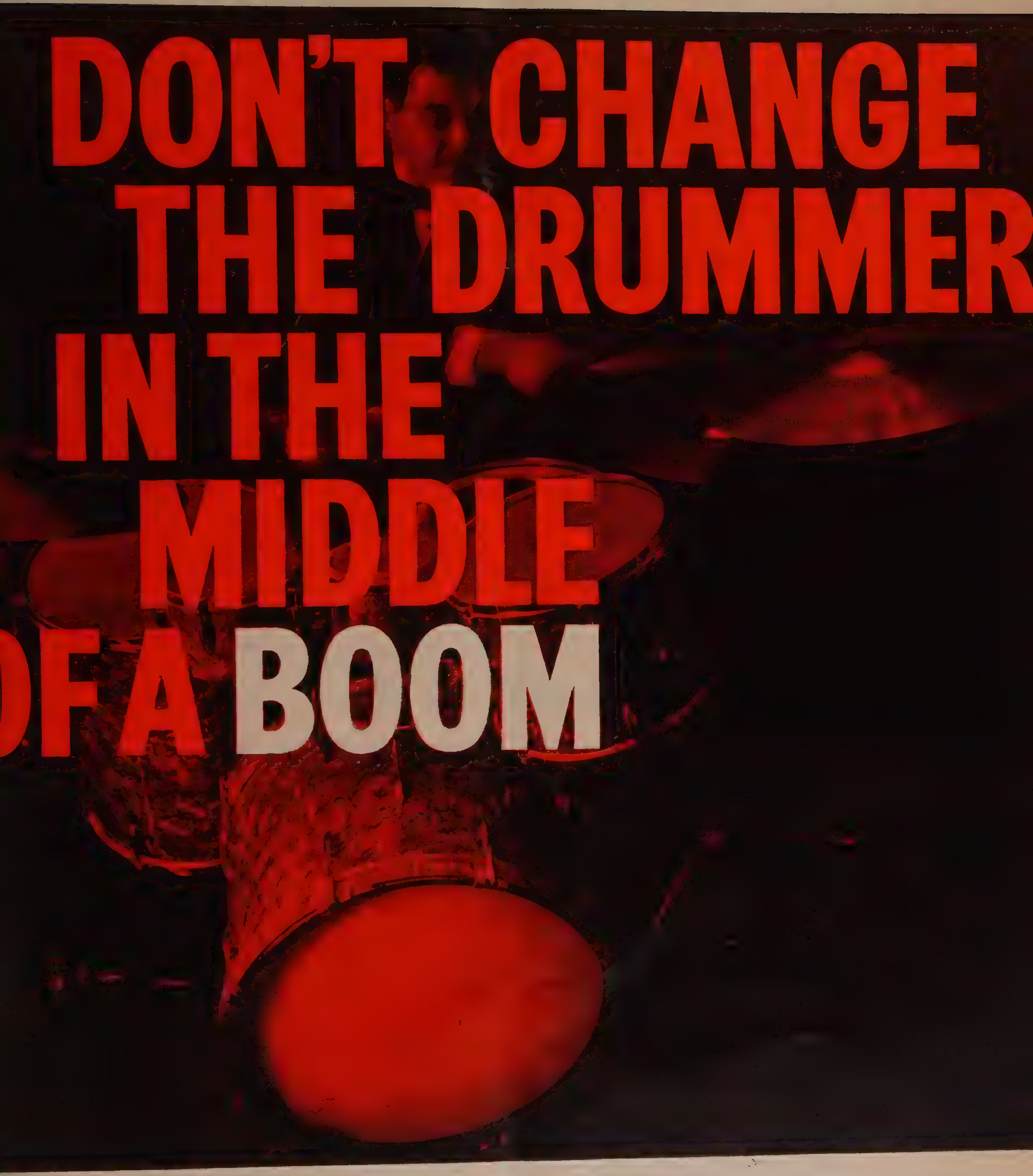
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OF A BOOM

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This

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campaign

helped

you to make a

50%

sales

increase

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–so what ?

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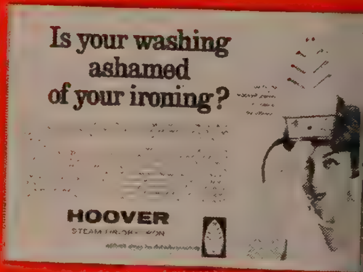

Is your washing
ashamed
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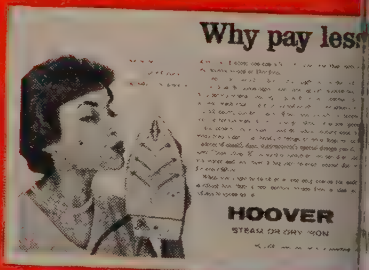

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A REPEAT PERFORMANCE
BUT MUCH

MORE OF IT

more advertisements

more often and in bigger spaces

more television

bringing a big expectation of an even

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over 13¾ million readers

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over 13¾ million readers

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bigger
sales
increase

details

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Dealers everywhere did a marvellous job and HOOVER advertising
certainly put real salespower behind this superb product.
This year HOOVER are running a similar campaign—but
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*1959 was a good year—HOOVER are out to make 1960 even better
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£ for £ here's sterling value—

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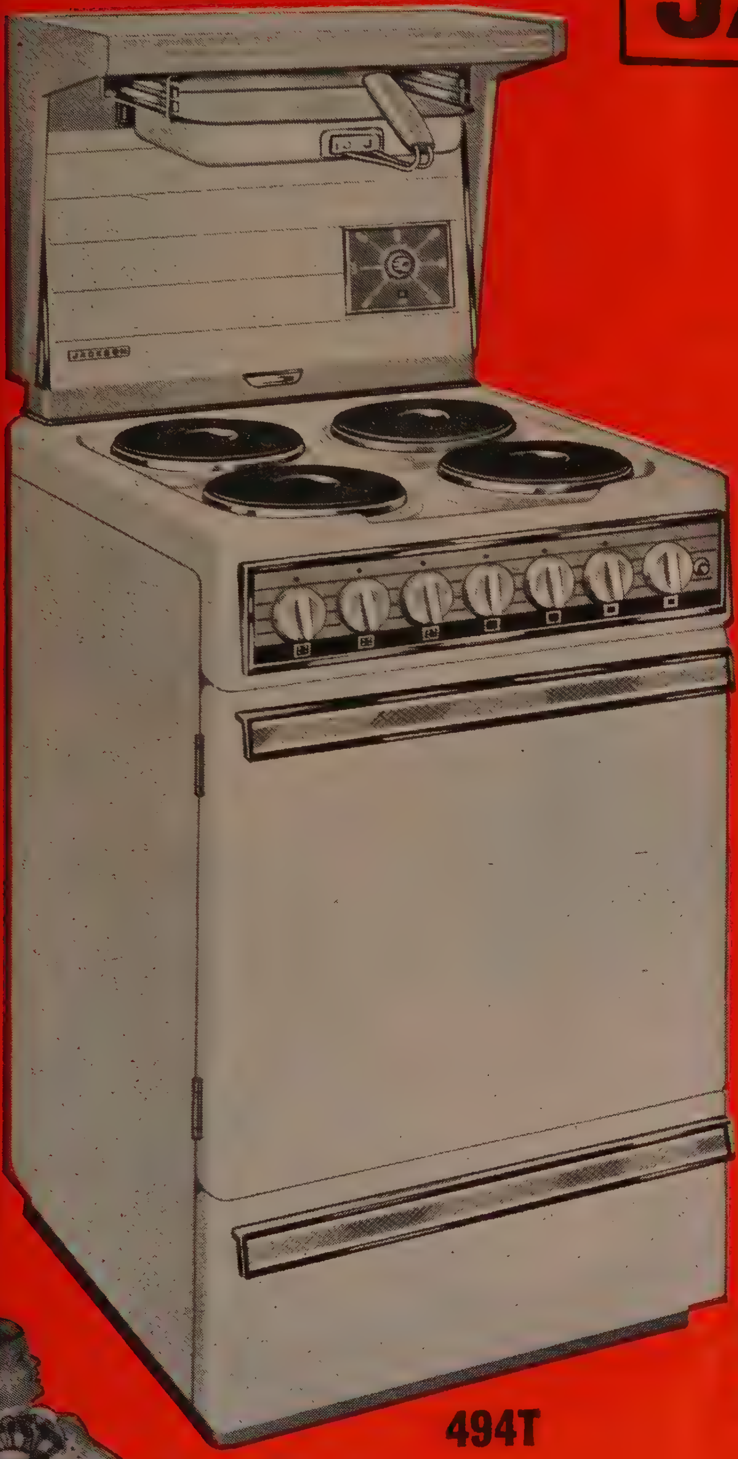

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EVEN FASTER, CLEANER, EASIER TO CONTROL

- Eye-level grill
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- 4 Speedrings—1 Very High Speed, each with 6 heat control
- Large oven with automatic light, glass door and roof protector
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- Huge heated cupboard
- Mobile plinth: £3 extra

£56

Other models also in great demand:— Highline 493T (3 Speedrings; no oven light)—£51. Highline 493 (3 Speedrings; no timer or light)—£45

and when Susan grows up this cooker will STILL be modern

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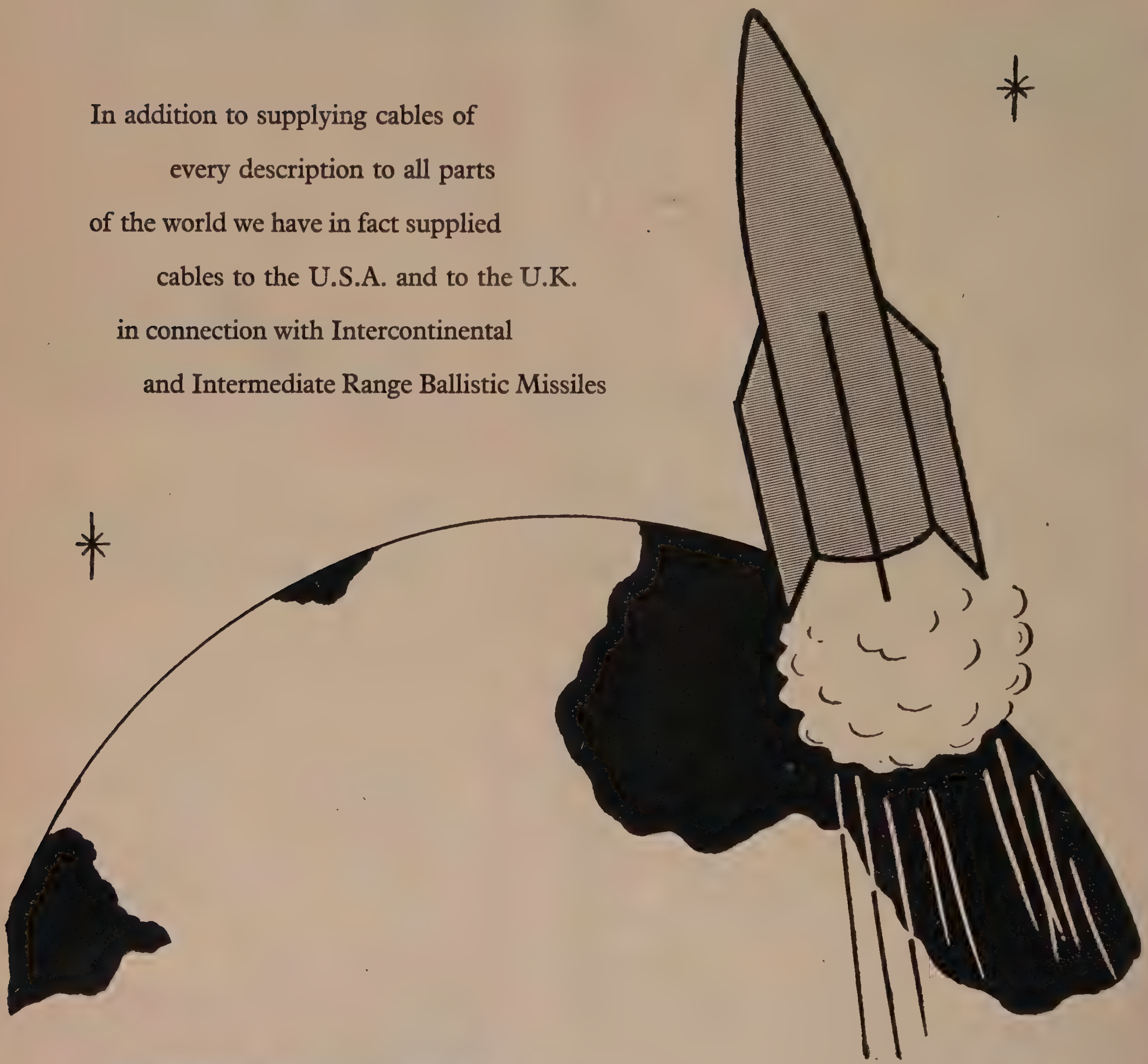

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REAR ACCESS FROM ADJOINING ROOM
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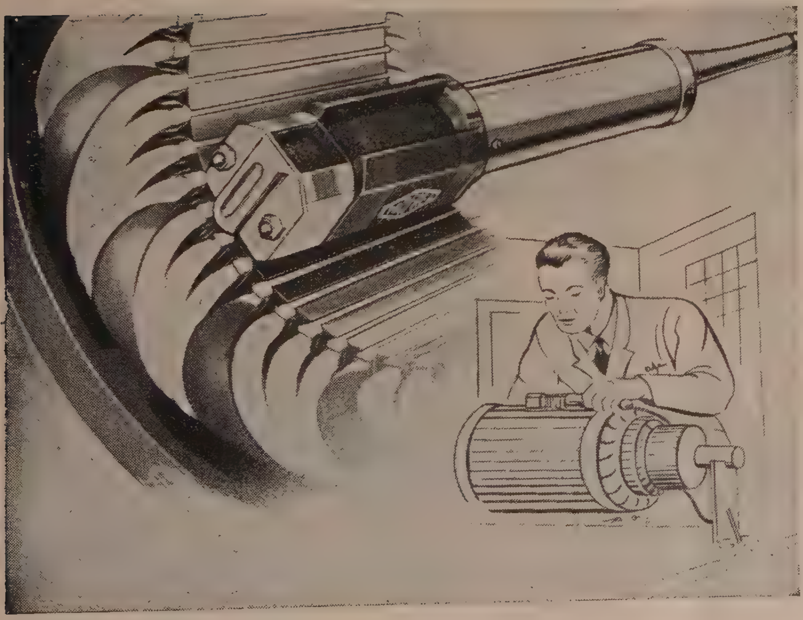
Universal fault finder . . .
MARTINDALE



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A new sensitive universal fault finder.
Will test largest alternator or smallest aircraft type motor.
Locates short circuit—open coil—wrong connection.
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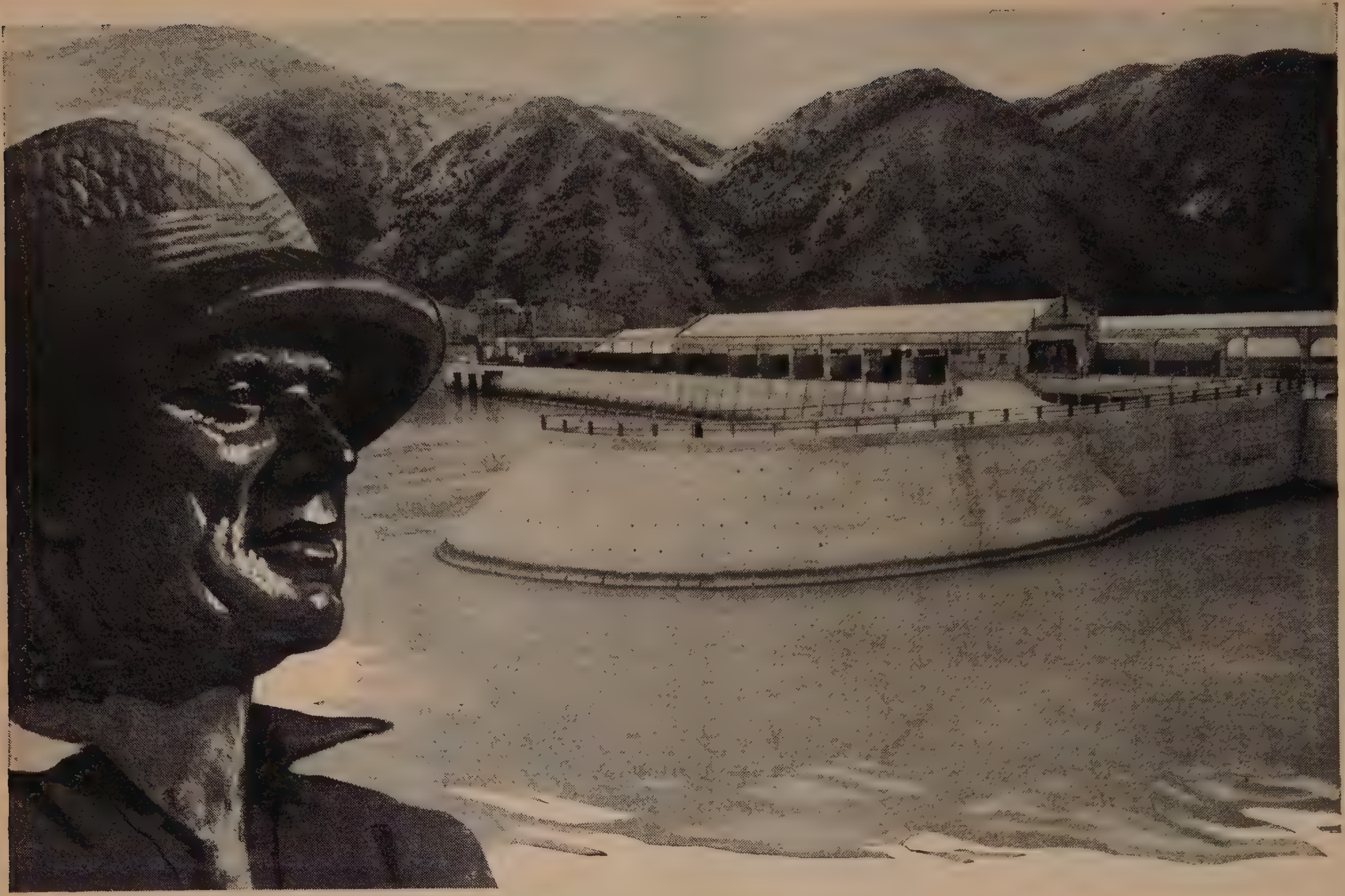

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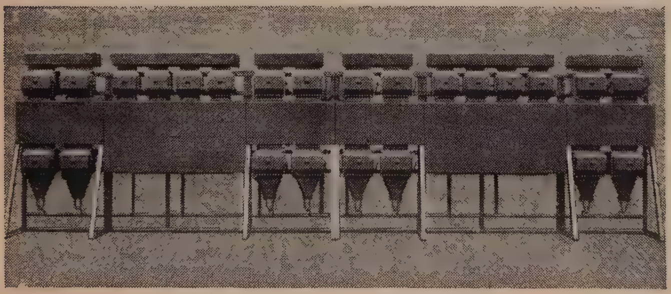

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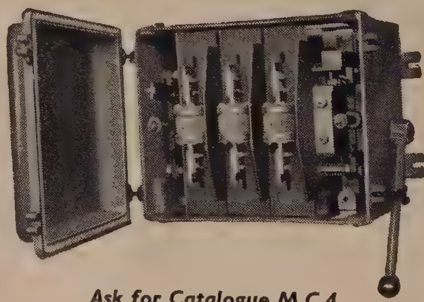

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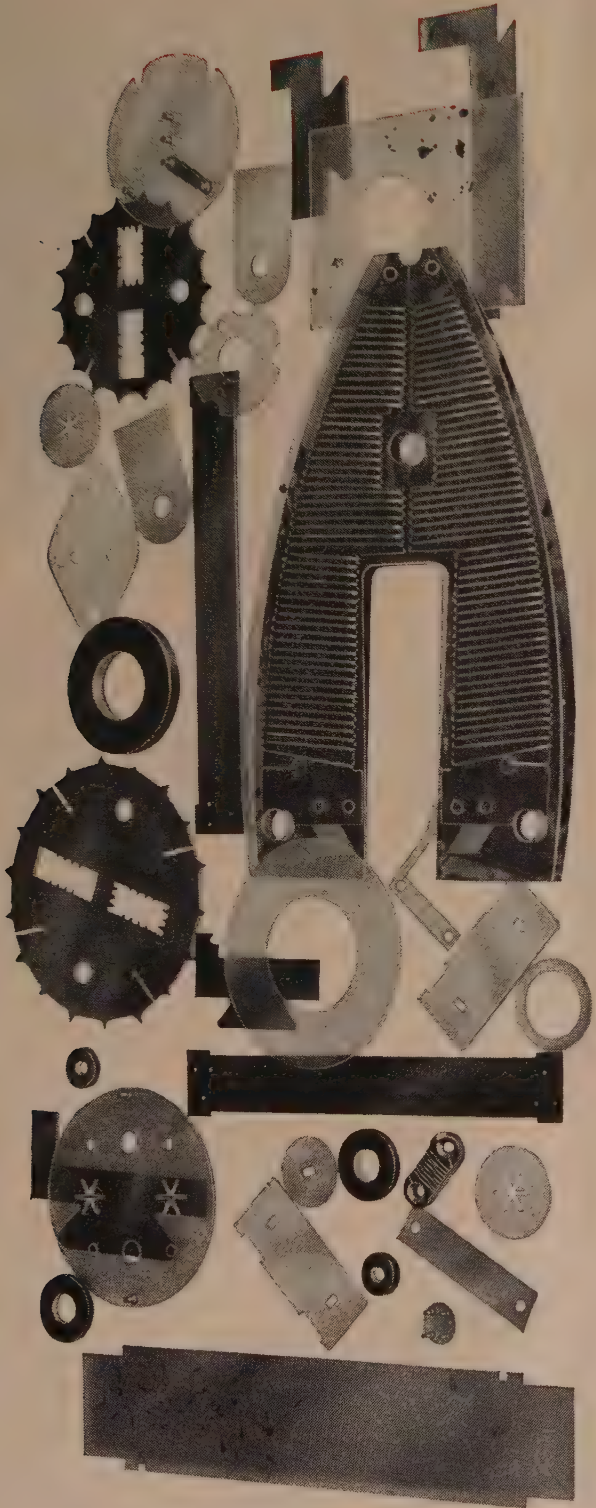

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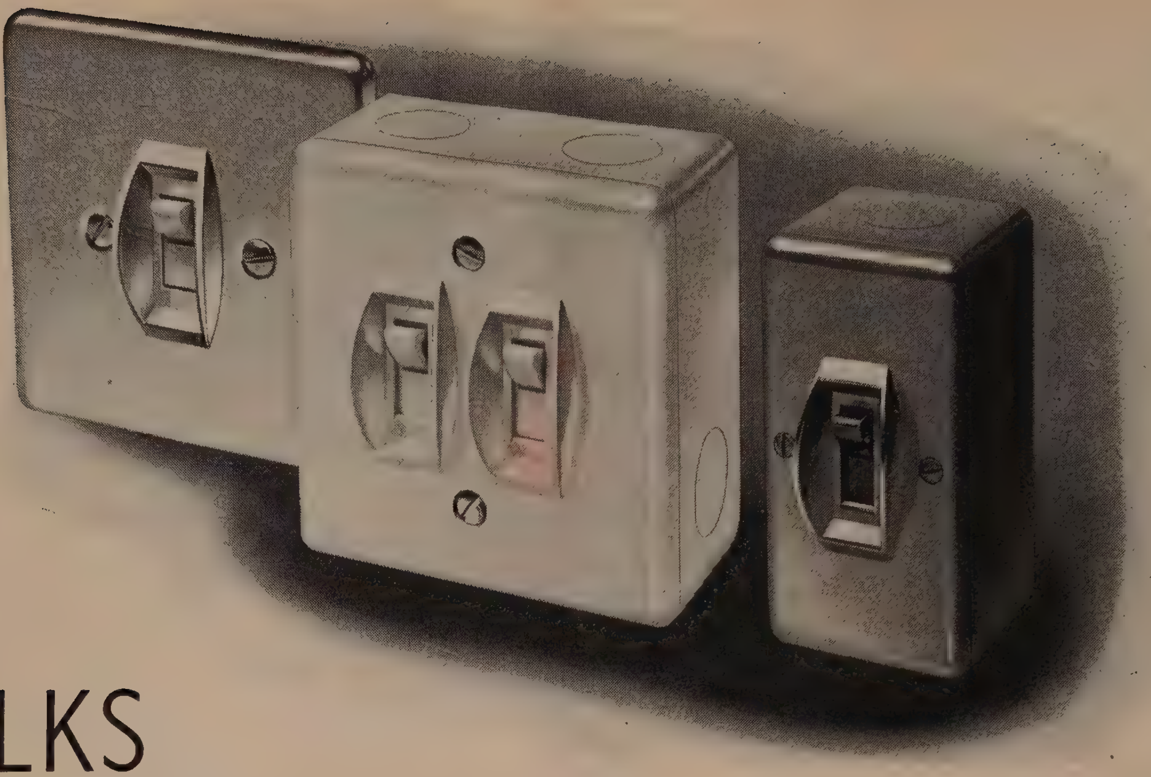

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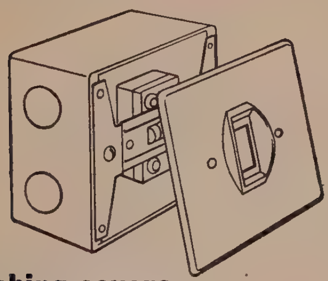
new **METALCAST** switches *for use in offices, hospitals, schools, etc.*

Special features include:

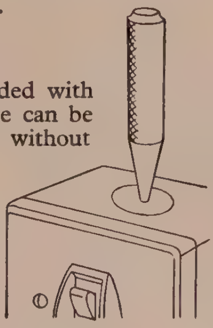


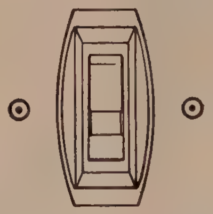
Matching covers and boxes

It is possible to avoid unsightly cast iron boxes in commercial surface work. The "Metalcast" box is of the same excellent finish as the plate and permits matching flush and surface installations.

Knockouts

Boxes are provided with knockouts. These can be removed cleanly without spoiling the finish. They thus obviate difficult drilling or bench work on site.



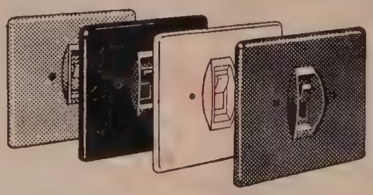


Effective dolly protection

The dolly cannot be damaged owing to the raised side protectors which also add distinction to the design.

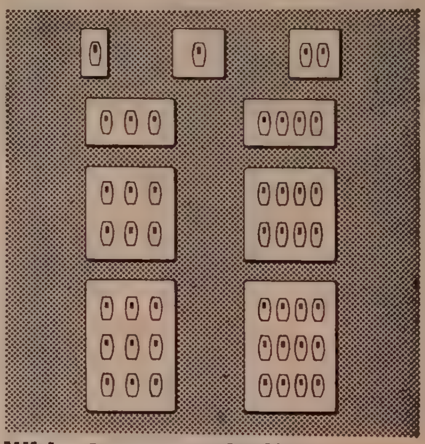
Secret fixing

Where required for schools and institutions all models can be supplied with plate fixing by miniature Allen screws.



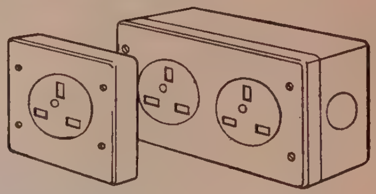
Choice of finishes

The complete Metalcast range is available in Florentine Bronze Plated Finish, Bronze Enamel, Silvercote Enamel or White Enamel. The enamels are based on an epikote resin to give great surface hardness and a resistance to acids and alkalis.



Widest range of all

See diagram—This applies to both flush and surface fixings.



Matching 13 amp sockets

In finishes as above, single and double units, unswitched, the single unit also being available switched.

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These are some of the reasons why so many Brentford Regulators are in service - often under difficult operating conditions; supplying dust precipitators, sea-borne rectifiers, and equipment controlling atomic reactors. They are specified wherever requirements are stringent and reliability is paramount.

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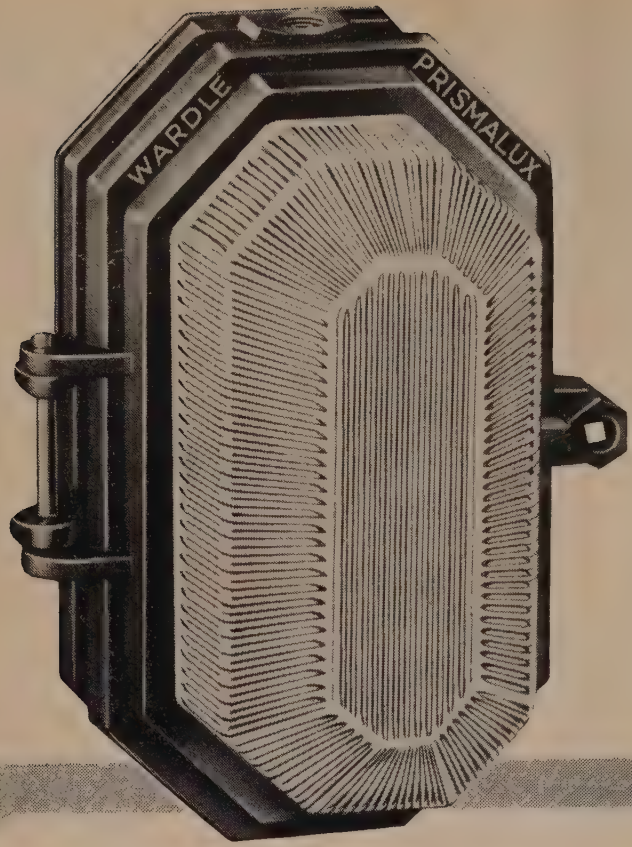

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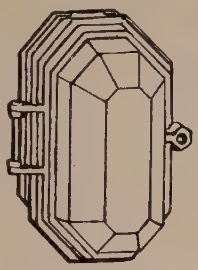
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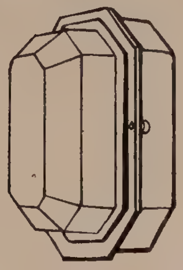
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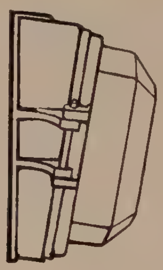
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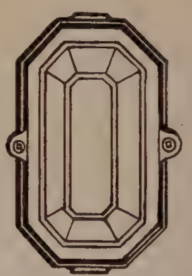
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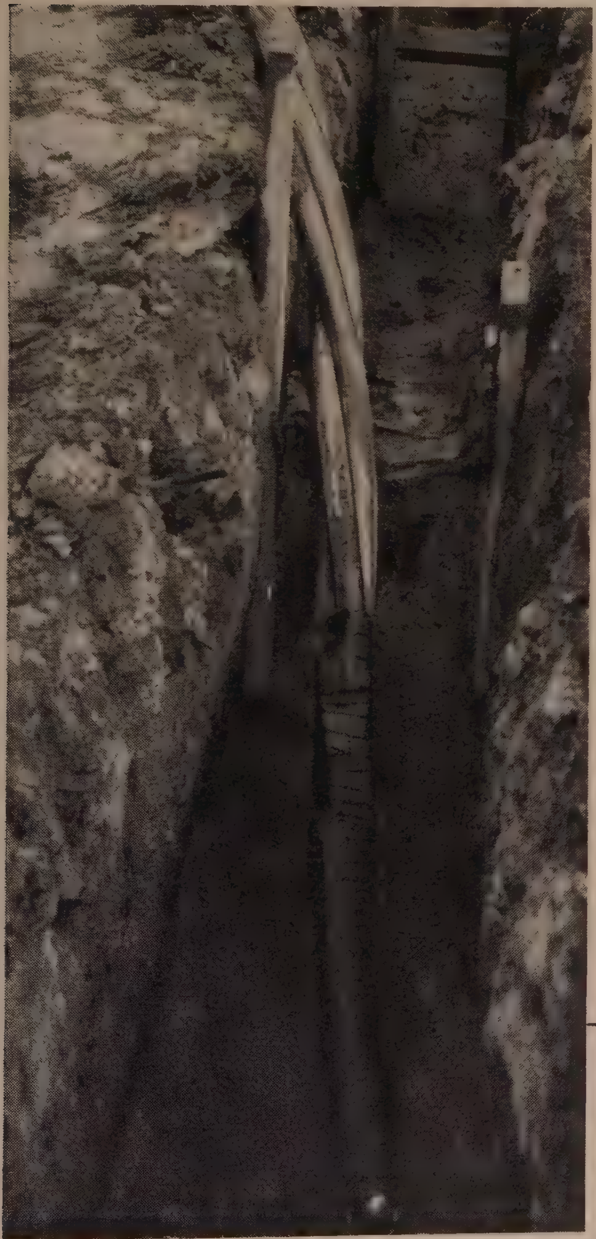

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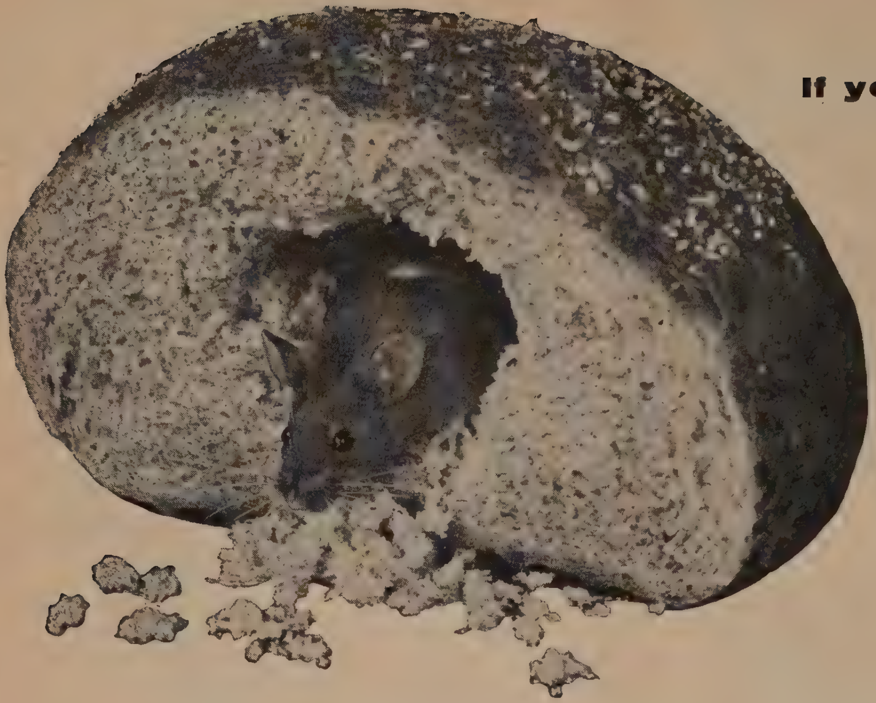

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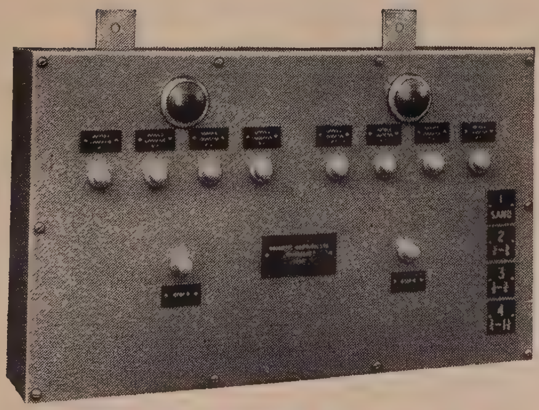

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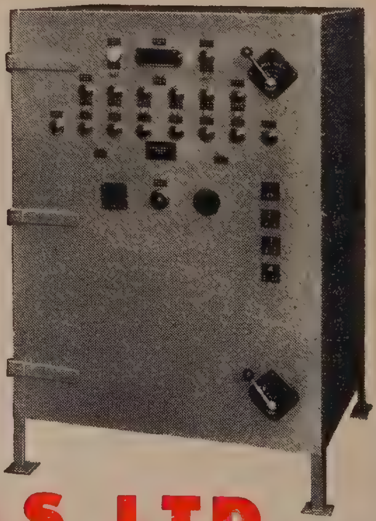

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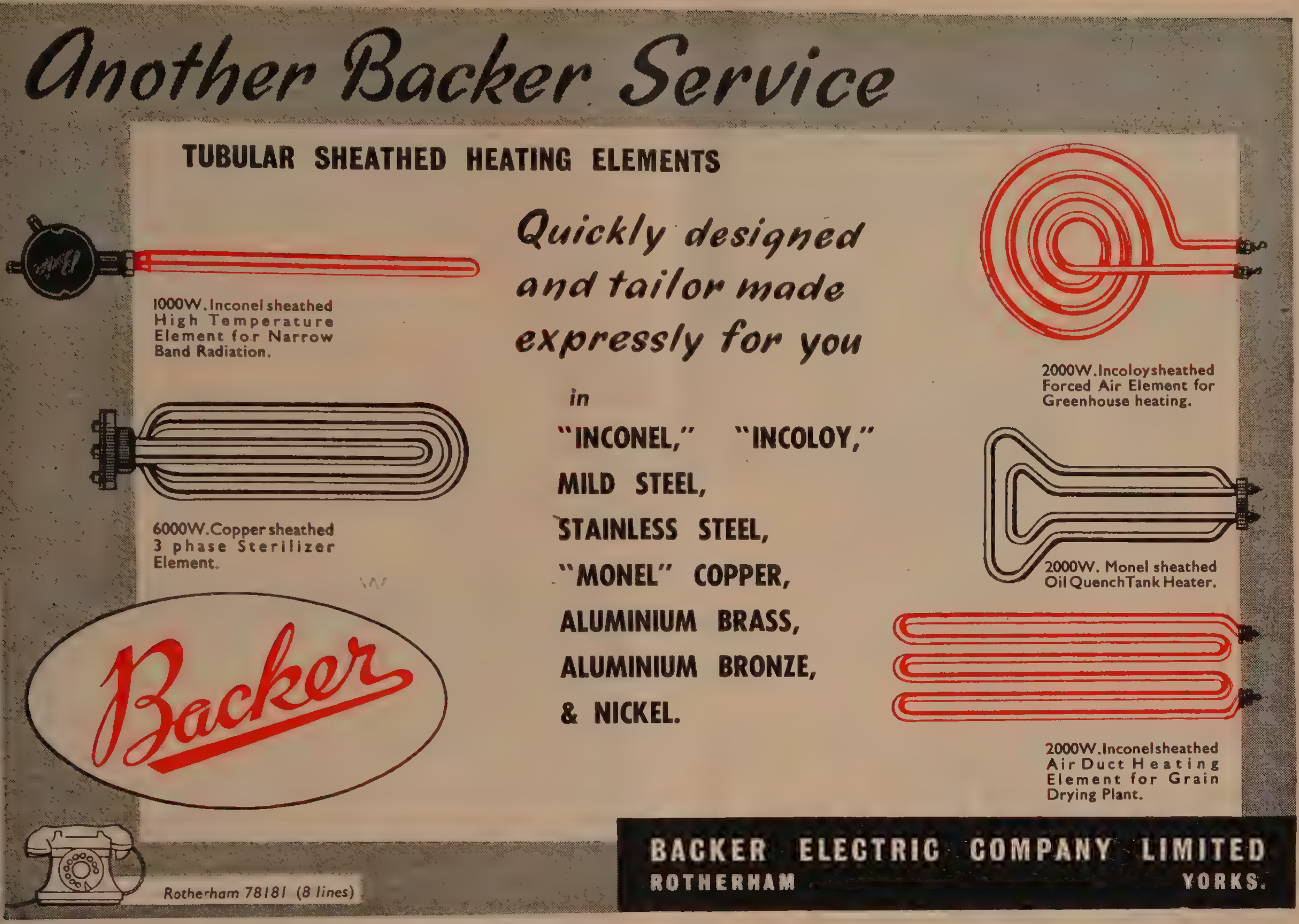

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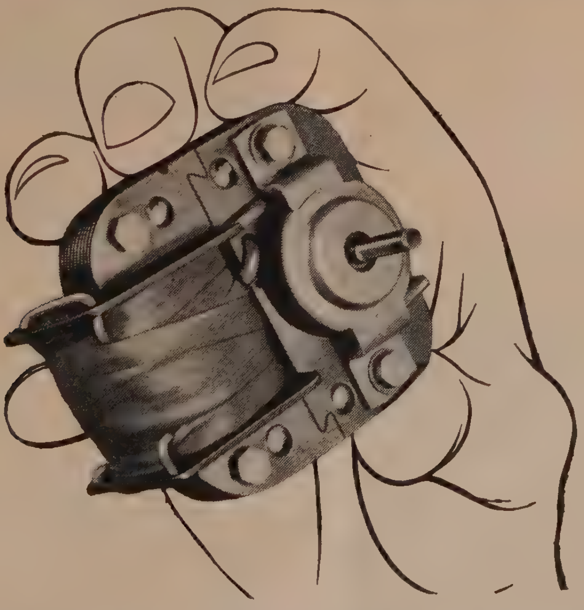

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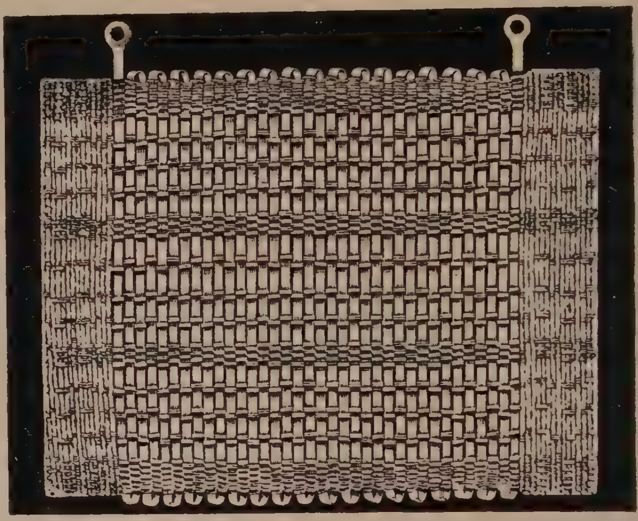

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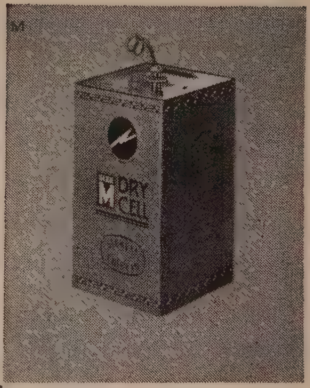

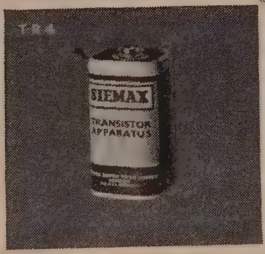

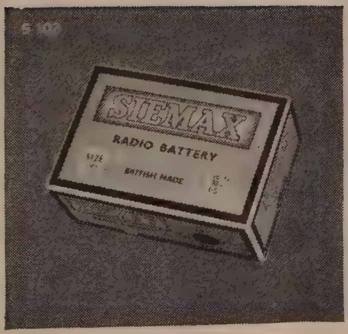

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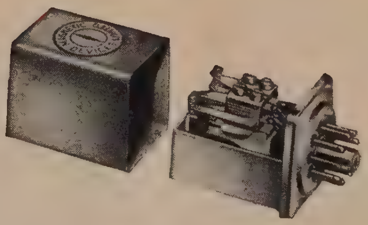

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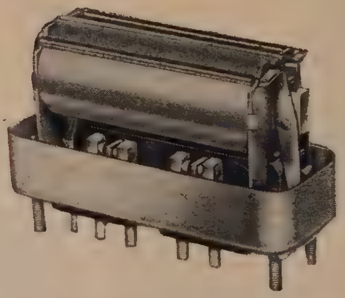

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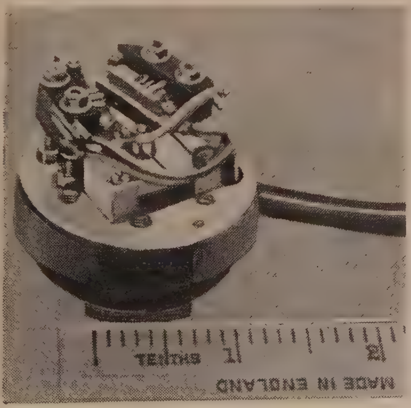

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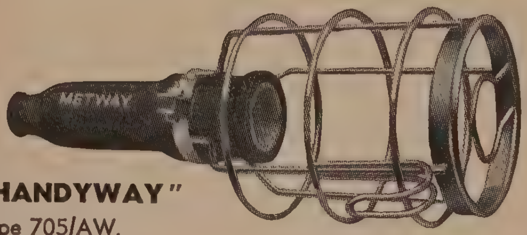

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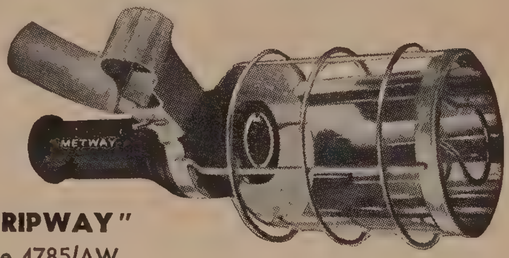

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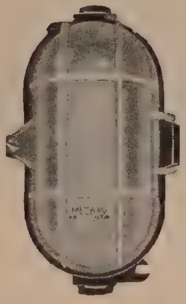

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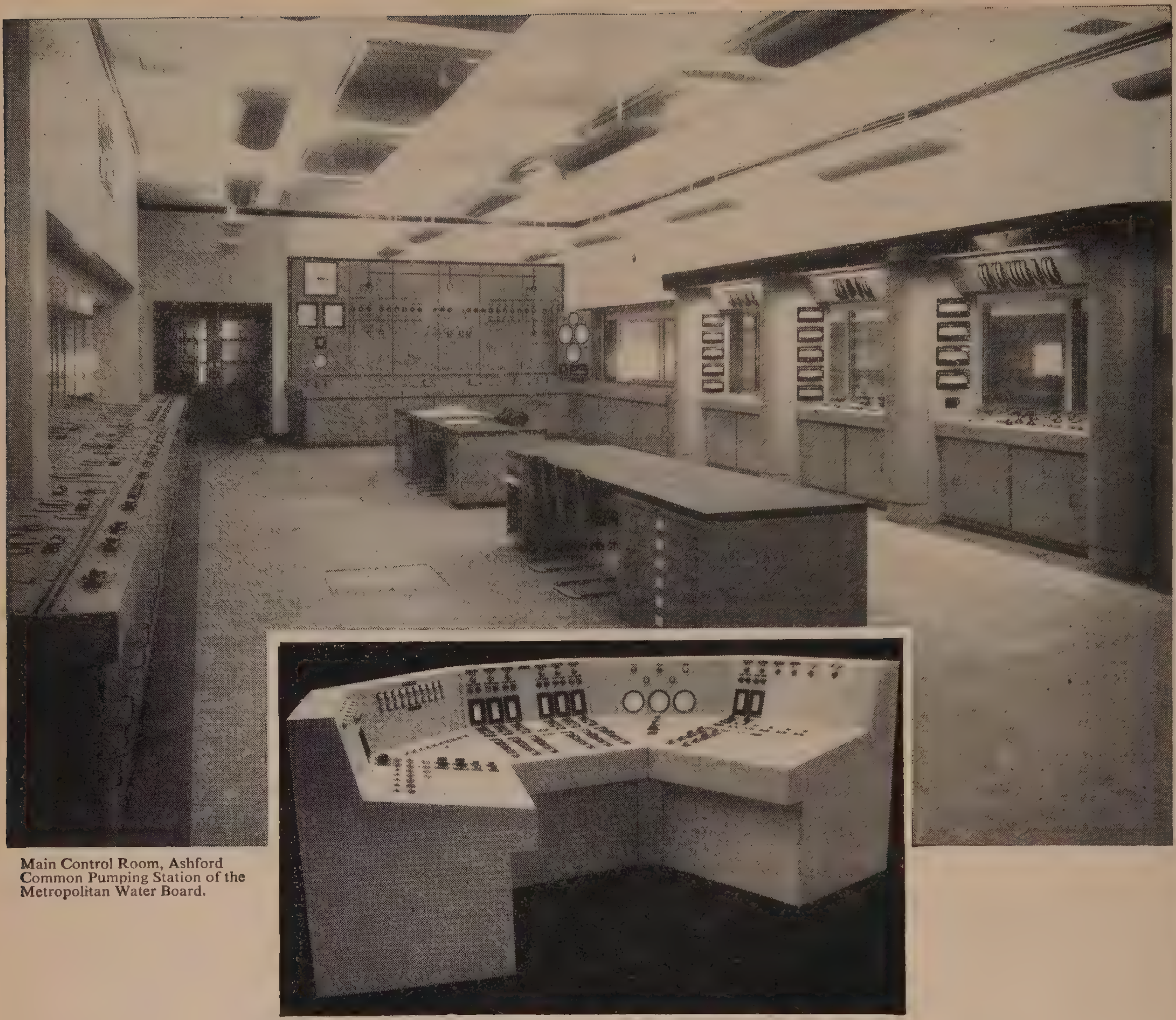

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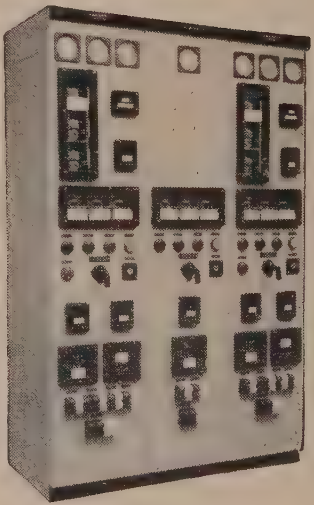

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ELECTRICAL REVIEW

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Electrical Association for Women	**920**	About 500 delegates from 196 branches attended the Association's annual conference at Folkestone last week
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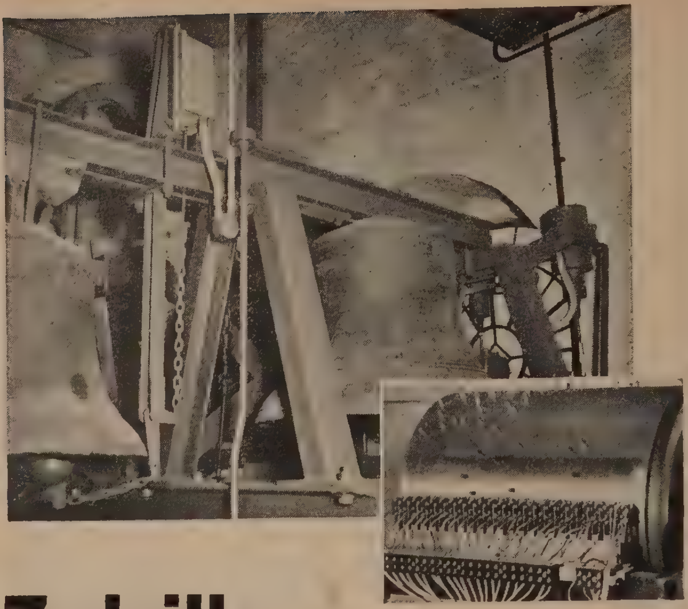

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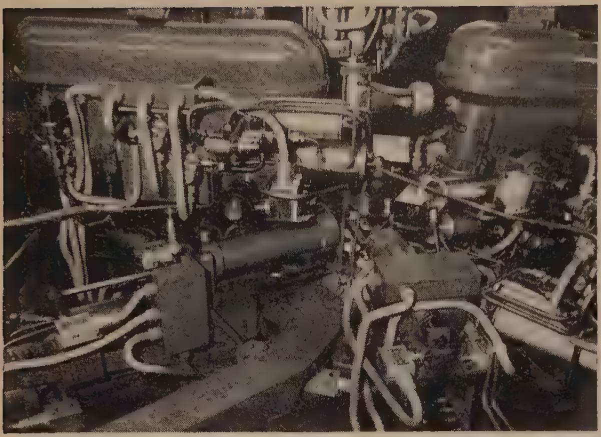

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ELECTRICAL REVIEW

13 May 1960 Vol. 166 No. 20 Established 1872

The Value of Research

SOME people in the electrical industry still regard the expenditure necessary to staff and equip a research and development laboratory as a luxury which could be done without. This is very short-sighted because nowadays the prosperity of any nation depends a great deal upon the ability of its industries to sell their products to other nations. If manufacturing organisations are not backed by really live and effective research and development they will be seriously handicapped in competing against foreign trade rivals who do not go into production and sell to the world without first determining how satisfactorily their products function when, for instance, subjected to widely differing climatic conditions. The British electrical industry, or the majority of both small and large organisations of which it is composed, recognised the value of research many years ago, but it is doubtful whether we rate it so highly as some American electrical concerns.

Nevertheless, the British electrical industry is not doing so badly. A typical example of the way things are going is illustrated by the new research and development laboratories of Standard Telecommunication Laboratories, at Harlow, which are briefly described in this issue. These laboratories are lavishly equipped with instruments, test gear and computers, and 75 per cent of the staff are fully qualified engineers, physicists, chemists and mathematicians. This company certainly means to get results and there is no doubt that it will. As an aside, it is of interest that Associated Electrical Industries, Ltd., are also opening new laboratories in Harlow in the very near future. Many other electrical concerns are also spending money on research on a similar scale and doubtful shareholders can be assured that the money is being very well spent.

We also have the British Electrical and Allied Industries Research Association (E.R.A.). This body conducts largely long-term research on behalf of member companies and although the results are of great value to the industry as a whole the Association's activities have long been limited by a shortage of money. The financial position of the E.R.A. is better now than it has been for some time but it can still be improved. An increase of membership would go a long way towards raising income to the required level and an increase in the Government grant would be a great help. The E.R.A. has been criticised for not entering into certain spheres of electrical research but what can it do without money? Sir Leslie Gamage, at the E.R.A. annual luncheon in London last week, stressed the fact that the work of the Association benefited the industry as a whole. The E.R.A. should be in a position to handle most of the industry's research problems and should therefore receive the greatest financial and moral support that the industry can give.

PSYCHOLOGY AND DESIGN

Most of our readers will have noticed that more attention is now being paid to the appearance design of electrical equipment. Odd shapes and awkward projections are disappearing into neat cubicles. Obviously, this is just common sense, provided due regard is given to minimising the extra costs involved. Another aspect of " design," which has been called " human engineering," is concerned with the relationship of man to his work and is generally applied to man/machine control systems. It is all too easy to criticise the types of control switches, position of instruments, etc., and the final design must be a compromise between electrical engineering techniques and practical experience of control engineers. Psychologists and other non-engineering " experts " are now showing an interest in these aspects of design and are propounding their own theories.

For many years, some of the larger electrical manufacturing firms in this country have been taking human engineering factors into consideration in their designs of control equipment. Recently a team of psychological experts suggested that control systems should be so designed that the operator could perform his duties when either standing or sitting, but a mine winding control unit was designed on these principles and shown at an exhibition two years ago by a British firm. Generally, we feel that electrical engineers are fully competent to deal with their own problems but, perhaps, they like to be told by the " experts " that they are indeed right.

E.D.A. AND THE MANUFACTURERS

The Electrical Development Association is such a familiar feature of the electrical scene that it is easy to take it for granted. The Council's fortieth annual report is a reminder of the scope of the Association's activities in promoting the use of electricity and of electrical appliances and equipment. Its advertisements and its displays at exhibitions, in which a high standard of interest and presentation are maintained, are only a part. Probably of more lasting value is the work done over a wide field of electrical education.

Nevertheless it is not difficult to think of directions in which more money could justifiably be spent in furthering the interests of the electrical industry. Judged by the size of the industry E.D.A.'s expenditure is modest. But it must be remembered that while the whole industry benefits from the Association's activities, the cost is borne by the supply side. This is a weakness. Individual manufacturers, of course, already spend large sums on their own publicity but they have recently recognised that there are advantages in supplementing these efforts by a collective approach to the tasks of promoting sales of electric cookers and refrigerators. Any move which now led to the manufacturers being brought back into E.D.A. would be welcome. Not only would they thus be encouraged to take a more direct interest in the general development of the industry, but with a broader based support and greater resources E.D.A. would speak with increased authority and effectiveness.

PAYMENTS TO THE A.E.A.

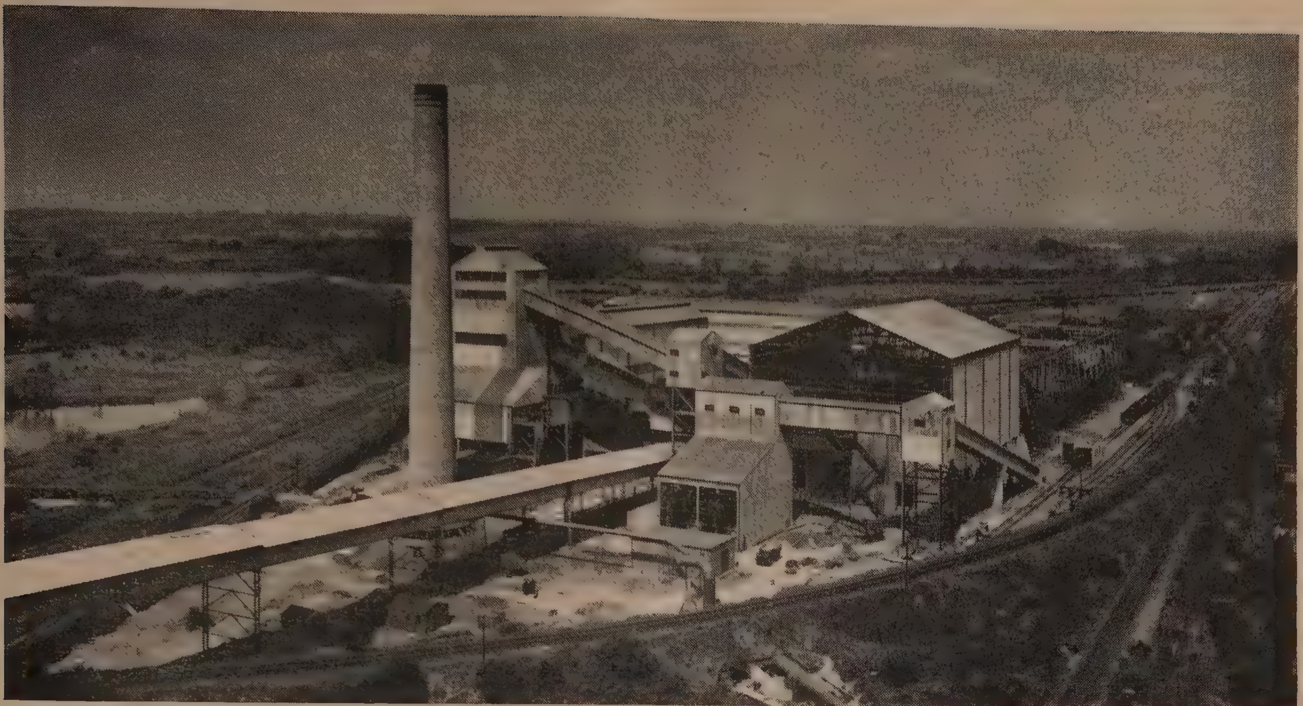
One element in the cost of nuclear power is the amount which the Central Electricity Generating Board and South of Scotland Electricity Board have to pay to the United Kingdom Atomic Energy Authority for the use of its patents, knowledge and development work. The Comptroller and Auditor General (Sir Edward Compton) in his report on the A.E.A.'s accounts says that whereas it was originally agreed that royalties should be paid on the basis of the installed capacity of nuclear power plant is was subsequently decided that payment should be made on kWh sent out. This change will probably operate in favour of the Boards. Moreover, the A.E.A. is to waive royalties in respect of the first four stations to go into service. On later stations royalties will be paid for a period of 20 years.

Sir Edward Compton seems to view this arrangement with some misgiving for he states that it will reduce the A.E.A.'s earnings substantially below the estimate of £50 million in fifteen years made in 1956. He says, however, that the decisions have been approved by Ministers and were beyond the discretion of the A.E.A.

THE NEW E.L.F.A.

There were no signs of despondency or despair at last week's luncheon of the Electric Light Fittings Association, despite its recent encounter with the Restrictive Practices Court. Mr. D. L. Tabraham, the president, insisted that the Association's decision to abandon its trading codes was in no sense an admission that they were not in the public interest; it was taken because of the difficulty of convincing the Court of this—at considerable expense.

But the formulation of trading conditions is, after all, not the only function of an electrical trade association. In this particular complex and rapidly-advancing section there is much scope for activities to which the Restrictive Practices Court can have no possible objection, or over which it has no jurisdiction. Some of these were mentioned by Mr. Tabraham and they are evidently of general acceptance because four other important lighting concerns have now joined the Association. We look to the E.L.F.A. to prove that, even without concerning itself with prices and trading conditions, a trade association can provide useful services for its members and their customers.



Iron Ore Preparation

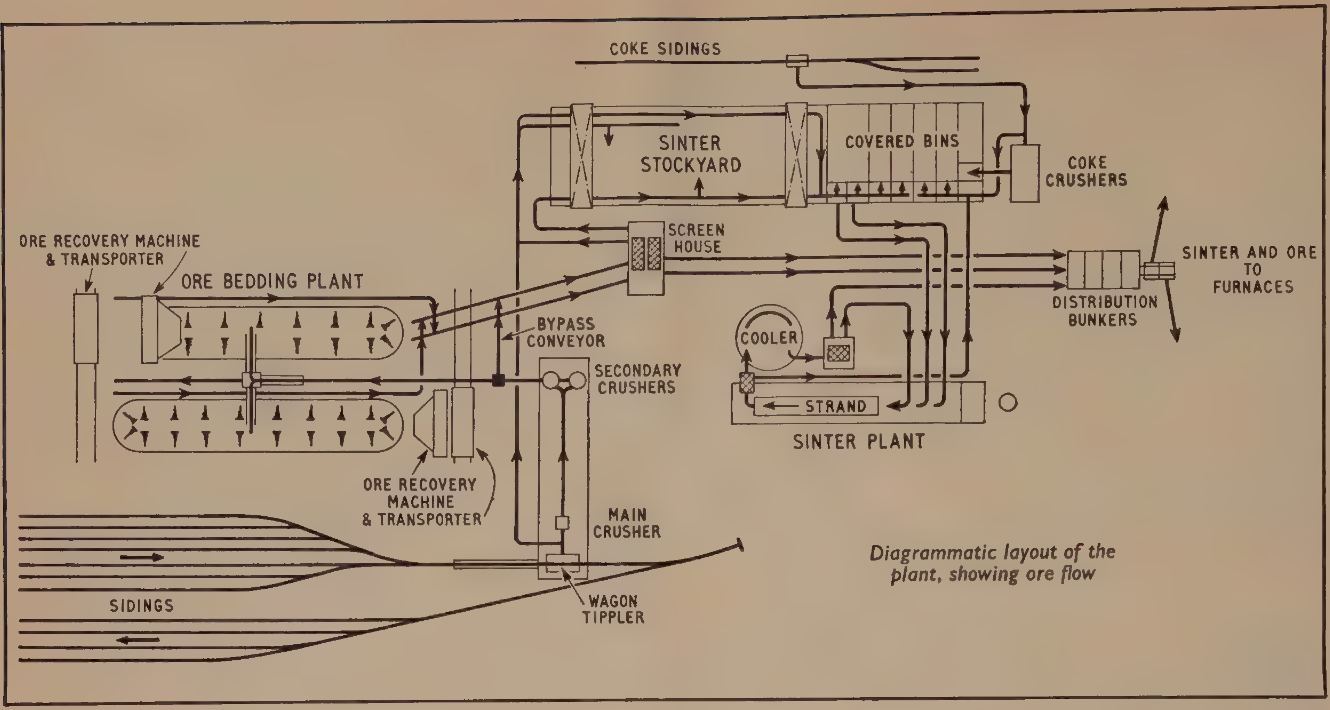
CRUSHING, BEDDING AND SINTER PLANT AT STANTON IRONWORKS

THE iron ore preparation plant at the Ilkeston works of the Stanton Ironworks Co., Ltd., can process up to 30,000 tons of ore a week. Occupying a 40-acre site, the plant took 2½ years to design and construct and cost nearly £4 million. More than three miles of conveyors are used and there are sidings for 700 wagons, while the total connected electrical load exceeds 6,000 kW. In the crushing section, ore is reduced to 3in size by primary and secondary crushers, and from here it is taken either direct to the blast furnace bunkers or to a bedding plant for storage and mixing. A major feature is the sinter plant in which a mixture of ore and coke fines is ignited and fused into large pieces suitable for feeding into the blast furnaces. The plant has enabled the company to improve the efficiency of these furnaces, increase the output of pig iron and to use reserves of home ore which would otherwise be unsuitable.

Ore is brought to the site by rail, the 25 ton wagons being gravity fed from the sorting sidings, where the various ores constituting the blend can be assembled, to the base of a 1 in 4 incline leading to a tippler. A trolley with automatic coupling and uncoupling facilities and hauled by a wire rope pulls the wagons at 140ft/min up to the tippler and its associated weighbridge. The hoist and tippler, which can handle up to 30 wagons hourly, are driven by two English Electric 127 h.p., 440 V d.c. shunt wound separately excited motors. These are supplied from a Ward-Leonard set consisting of a 450 h.p., 980 r.p.m. slip-ring induction motor and two separately excited 104 kW d.c. generators, housed in a substation with its associated control panel and the incline haulage motor. To prevent the entry of ore dust into the substation, a pressurised ventilating system is employed, air entering through a "Visco" self-cleaning filter. Some air is ducted directly to the hoist and tippler motor for cooling.

From the tippler discharge hopper, ore is taken by a drop bar feeder, operated through a variable speed drive by a 20 h.p. constant speed squirrel-cage motor, and passed to the primary crusher via a Ross chain curtain feeder and a seven-roll grizzly feeder, the fines present by-passing the primary crusher by filtering through the rolls and falling on to the main crusher house conveyor via a plate feeder. The primary crusher is of the Hadfield two-roll type, each roll being driven by a 200 h.p., 3·3 kV, 591 r.p.m. English Electric slip-ring motor having a closed cooling air circuit. The crusher, which is rated at 800 tons/hour, reduces the lump ore to a 6-8in size, and this falls through a six-roll grizzly feeder to the main 72in conveyor and is taken to either or both of the secondary crushers, selection being made by traversing the crusher feed hopper. Two 66in diameter electromagnets are positioned over the main conveyor to remove tramp iron.

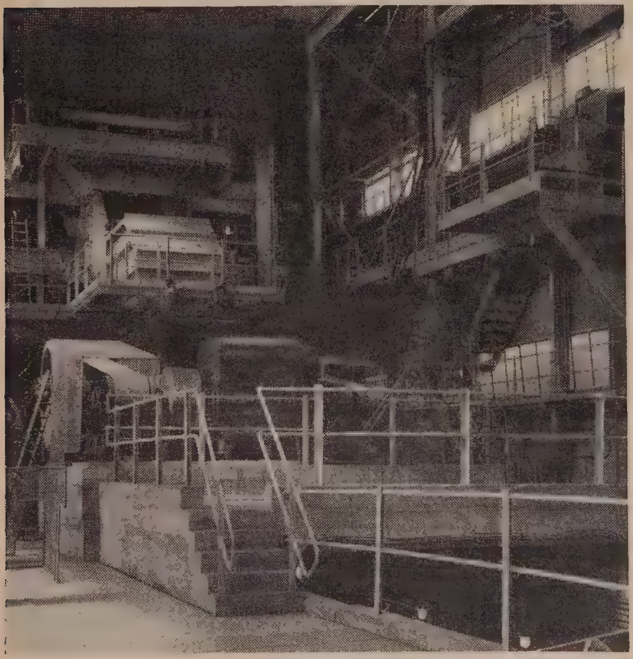
The secondary crushers are of the Symons gyratory cone type and each is driven by a similar motor to those used for the primary crusher, thereby effecting a degree of standardisation and reducing the number of spares being held. The liquid starters for all of the crusher drives are motor operated and fully automatic. From the secondary crushers, ore, now reduced to a maximum size of 3in, is taken by conveyors directly to the screen house or to a travelling wing tripper in the bedding plant.



Diagrammatic layout of the plant, showing ore flow

When ore is being taken to the bedding plant, flue dust recovered from the blast furnaces is fed from a ground hopper on to the ore both for further processing and to prevent sticking. The conveyor feeding the wing tripper is driven, through a fluid coupling, by a 120 h.p. squirrel-cage 720 r.p.m. motor, the largest conveyor motor on the plant. The total power of the 28 drives in the crushing section is 1,864 h.p.

The crushing section is operated remotely from a control point mounted at high level in the crusher house. The main and secondary crushers are started independently once their respective oil lubrication systems and the main crusher's roll flotation system are operating. The conveyor motors and the tramp iron magnets are energised by the pressing of a button, after a warning hooter has sounded for 30 sec, in reverse order to the ore flow starting with the wing conveyors in the travelling tripper. A power-sensitive relay in the electrical supply to the tripper prevents ore being fed to the machine unless the wing stocking conveyor is operating. Independent starting is provided for the drop bar feeder to control the flow of material from the tippler hopper. If an emergency arises, all conveyors shut down, while under fault conditions the conveyors shut down in the reverse order to starting, i.e. in flow direction, up to the fault point. The conveyors beyond this point continue to run.



Primary crusher, with two 200 h.p. driving motors. The crusher house control desk can be seen on the right of the picture

The crushing section substation contains a seven-panel, 3·3 kV, 100 MVA oil circuit-breaker board; the two units in the incoming supply are hand operated, the remaining five supplying the crusher motors and Ward-Leonard set being solenoid operated. There is a 415 V switchboard incorporating direct-on-line contactors for the conveyor drive motors, etc. The d.c. operating coils for these are supplied from duplicate transformer-rectifier units having an output of 220 V d.c. The tramp iron magnets are supplied from two oil-cooled metal rectifiers, each rated at 37·5 A, 220 V d.c. and operating from a 415 V supply.

Bedding Plant

In the bedding plant the various grades of ore are spread horizontally in piles, each containing 6,000 tons, and are reclaimed in vertical slices to ensure a consistent mix. Ore recovery is carried out by two machines each having an oscillating harrow bringing the material down to an endless transverse plough conveyor which passes it to a reclaiming conveyor alongside the bed. Each machine, which has an 80 h.p. slip-ring motor driving the plough conveyor and harrow, is propelled on rails on both sides of the bed by a 15 h.p. slip-ring motor. A magslip system is provided to indicate misalignment of the machine.

From the reclaiming conveyors, ore is taken to the screen house by either or both of the two conveyors, selection being made by travelling shuttles, where four Gyrex vibrating screens with ½in mesh separate the material. Ore greater than ½in size is taken to four 200 ton distribution bunkers by two 250 tons/hour conveyors, each fitted with an " Adequate " belt weigher. Smaller material and fines are conveyed to the sinter materials stockyard. Rotary blade samplers are fitted to both these sets of conveyors enabling samples to be removed for analysis.

From the distribution bunkers, material is taken to ground hoppers feeding conveyors leading to the blast furnace conveyors by two Head Wrightson transfer cars, each having a capacity of 22½ tons, fitted with Metropolitan-Vickers electrical gear. A 10 h.p., 1,440 r.p.m. motor drives a compressor on each car for the pneumatically-operated bunker doors. At these bunkers is a substation with a control panel for the reclaiming conveyor system. In this section there are 74 drives totalling 1,396 h.p.

The stockyard, which is 600ft long and has a capacity of 50,000 tons of ore fines, is an open store from which ore is taken to eight blending bunkers in a covered section by two 17½ ton Henderson grab cranes and a conveyor system. Coke for the sinter process is brought by rail and taken from a track hopper via a Syntron vibrating feeder and conveyed to two Sheepbridge rod mills, each 6ft in diameter, 12ft long and capable of crushing up to 8 tons an hour to less than ⅛in size. These mills are each driven by a 150 h.p., 3·3 kV, 740 r.p.m. " Tri-slot " Laurence, Scott motor controlled by an Allen West solenoid-operated oil circuit-breaker. From the mill the coke is conveyed to a coke fines bin also in the covered stockyard. This material handling section is controlled from four stations and a public address intercommunication system is provided, linking the stations and the grab recovery cranes.

Sinter Plant

Material is taken from the various ore and coke fines bins by table feeders and conveyed to surge bins in the sinter plant building. A continuous weighing system is incorporated in the conveyors for the ore and return fines, showing the weight as a product of the instantaneous weight of a section of the belt and the belt speed. Since the erratic nature of the material feed would produce a misleading indication of flow rate, an integrator is incorporated. The rate and total indication has an accuracy of ±1 per cent.

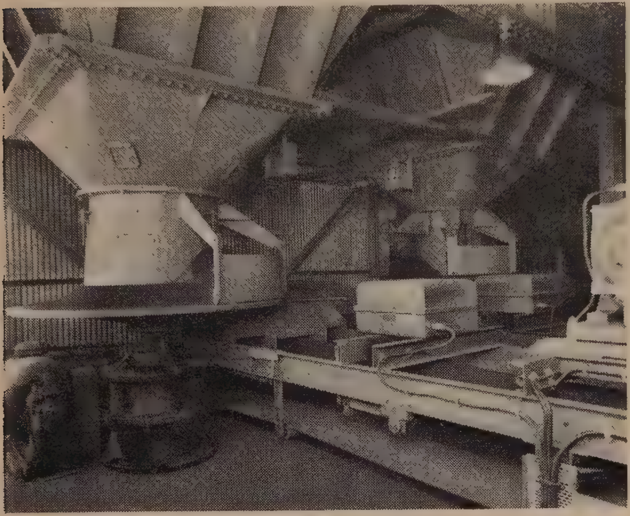
The feed to the surge bins is automatically controlled. Each bin is supported on four load cells which incorporate a resistance network whose value is changed by the physical deformation of the cell under varying loads. The output, proportional to weight, is fed through a magnetic amplifier to indicators and relays controlling the bin feed conveyors, which are stopped when the bins are 90 per cent full and restarted when the weight falls to the 60 per cent full value.

Travelling wing tripper and one of the ore recovery machines can be seen in this view of the ore bedding section

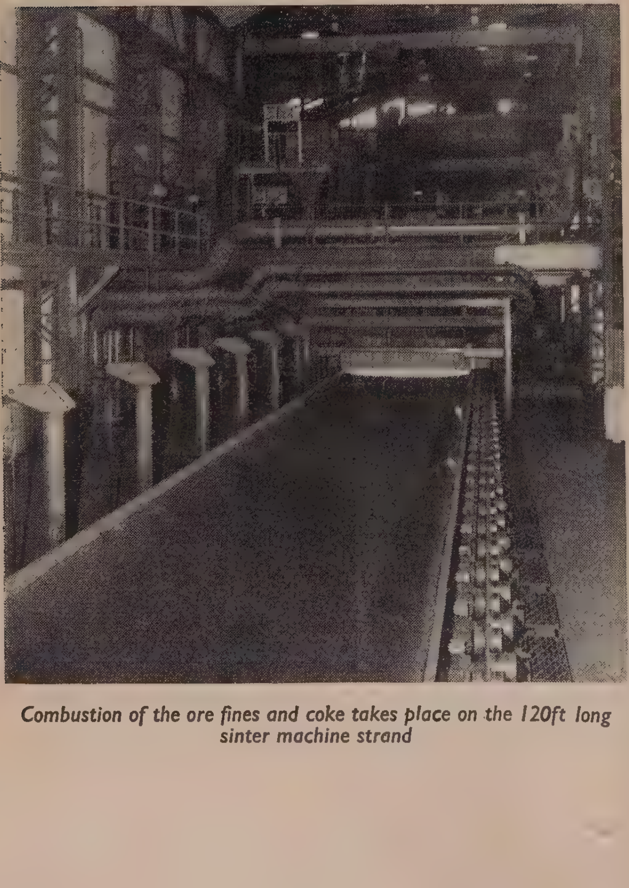
Covered bins in the sinter materials stockyard

From the bins, ore and coke are conveyed via table and constant weight feeders and in continuously regulated proportions to a mixer with a drum driven by a 45 h.p. motor. The feeder table delivers material on to the constant weight feeder which comprises a variable speed conveyor provided with a weighing section. For a given plough position the volume of material delivered is approximately proportional to table speed and if changes in plough movement, material size, density or moisture content can be detected, a constant weight supply can be maintained by adjusting the table speed. A beam with a weight counterbalanced by the material on the weighing section of the second feeder is attached to a differential transformer which varies the input to a magnetic amplifier. The output from this controls the shunt field of the table motor. In practice, changes in the physical condition of the material may cause instantaneous variations of up to ±25 per cent, and to maintain the feed within ±0·5 per cent over a period of not less than 3 min, the table speed must be corrected at 300 per cent/min. Each constant weight feeder driving motor has a tachogenerator supplying an indicator scaled in tons/hour at the control desk, and an additional system provides an indication of total tonnage conveyed. Each weigh beam position is indicated at the control room and at the appropriate feeder to facilitate manual plough setting.

The ore and coke mix is taken from the mixer and spread on the continuously moving sinter machine strand, or hearth, by a conveyor, a swinging spout and a vibrating tray feeder. In the sinter machine, which is 120ft long, the mixture is ignited under a gas-fired hood and combustion is continued as the strand moves at between 4 and 13ft/min by air being drawn down through the bed by an extraction fan. The 15 h.p. sinter machine drive motor is supplied from a Ward-Leonard set, the generator of which also supplies the motors of the table and constant weight feeders controlling the material flow to the mixer. These drives can therefore be adjusted as a unit by varying the generator voltage, or independently by individual control of the motor shunt fields. There is provision for a range of individual feed rates of 3:1 and a further 3:1 range for the overall control of the total feed rate.



Material is delivered to a mixer in the sinter plant by constant weight feeders



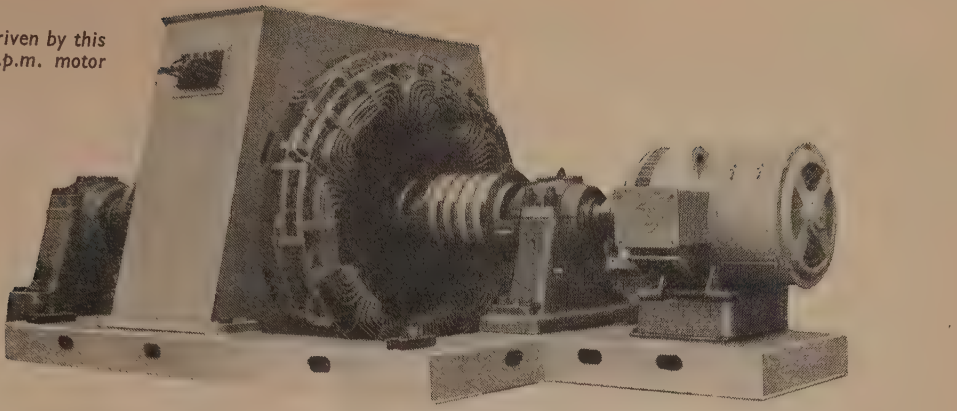
Combustion of the ore fines and coke takes place on the 120ft long sinter machine strand

The main sinter fan, of Howden manufacture, is designed to extract 400,000 cu ft of air/min at 300°F against a static head of 32·5in w.g. and has a normal starting torque with vanes closed of 4,400 lb-ft. The fan inertia is 276,000 lb/ft^2. It is driven by a 2,720 h.p., 750 r.p.m., 11 kV English Electric synchronous induction motor running at unity power factor and having a motor-operated liquid starter and solenoid-operated 400 A, 11 kV oil circuit-breaker with a rupturing capacity of 250 MVA. The motor combines the characteristics of a wound rotor induction motor for starting and a synchronous machine during running. The machine will synchronise against 100 per cent torque should the fan vanes be jammed open during starting. The fan exhausts through a 200ft high chimney, and a Howden multi-vortex cleaning system, with secondary fan, is installed to prevent dust emission.

From the end of the strand the hot sinter is passed through a breaker, driven by a 40 h.p. motor, and via a vibrating screen and Schenck feeders to a Lurgi rotary cooler which has a mean diameter of 45ft and a bed width of 6ft. The cooler has three fans, each driven by an 80 h.p. motor. Dust is extracted by Howden " Centicell " equipment. The fines are taken from the vibrating screen and passed to a return fines bin at the stockyard via a quench trommel. Cooled sinter is conveyed to the distribution bunkers, a portion being returned to the sinter machine to form a hearth layer to prevent combustion damaging the strand.

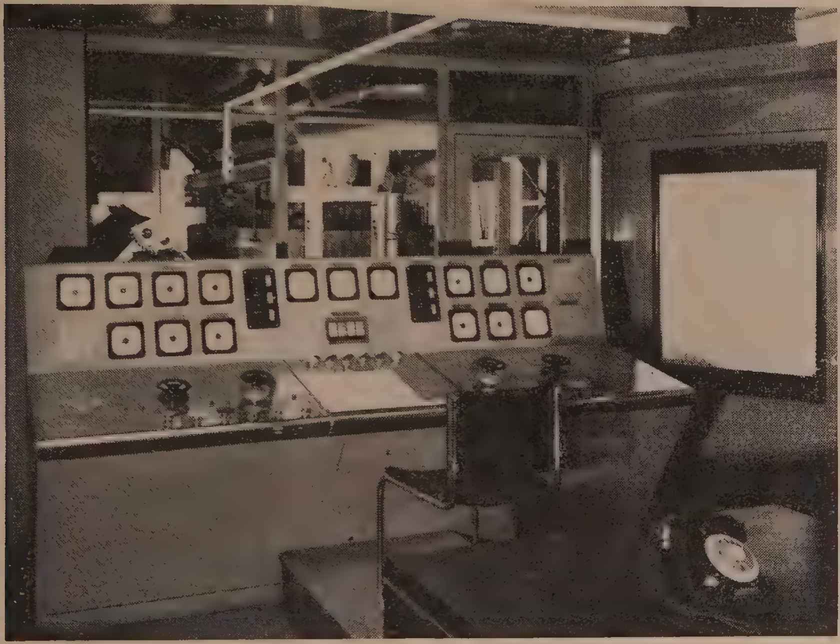
The main distribution equipment for the 11,000, 3,300 and 415 V supplies used in the sinter plant is housed in an adjacent two-storey substation, which also houses contactor equipment, the motor-generator sets, motor-operated rheostats, magnetic amplifiers and the public address intercommunication system amplifiers. There are three contactor substations for the material handling and coke preparation plants, and the sinter fan drive is housed in a motor room next to the fan. In the sinter plant there are 123 principal drives, which give a connected total in this section of 4,934 h.p., including the main fan motor. The total power of all the plant drives is 8,194 h.p.

There are three control stations for the coke preparation, material transfer and sinter process sections, at each of which the plant operator can select " Group Run " or " Individual Run." If the former is selected and the master start button pressed, a warning sounds, after which the drives required for a selected programme start in sequence and are interlocked. Should any drive jam, the preceding drives stop in sequence and cannot be started without the alarm warning. Individual run is selected to enable any drive to be operated for maintenance. Each drive has a local " stop-start " pushbutton and isolator, and the conveyors have wire-rope operated safety switches. The local start button is operative only when the drives are under individual control. Enclosed contactor control equipment is employed, the cubicle doors being interlocked with a Castell key system. Totally enclosed fan cooled machines are used throughout, to prevent dust damage. Single wire armoured,



The sinter fan is driven by this 2,720 h.p., 750 r.p.m. motor

Control desk for the sinter process



p.v.c. or paper insulated and p.v.c. sheathed cables have been installed, with double-sealed glands to prevent dust entry.

Conveyors external to the sinter plant also have a pull-wire emergency trip switch system manufactured by the Deco Engineering Co., Ltd., which stops the conveyors in sequence. Before restarting, the switch at the tripping plant must be manually reset. Five-pole local motor isolators and "stop-start" pushbuttons are installed at each conveyor motor, again starting only when the conveyor is selected for out-of-sequence operation.

Power Supplies

Duplicate 11 kV busbars in the main ore preparation plant substation are supplied by feeders from the Stanton Ironworks power house and the East Midlands Electricity Board substation in the power house through Reyrolle 250 MVA spring-closed oil circuit-breakers. Similar circuit-breakers with off-load busbar selection switches connect the eleven outgoing circuits to either bar, dependent upon load conditions at the works power station. As a result of the increased load due to the ore plant and other developments, an extra 6 MW condensing turbo-alternator of Fraser & Chalmers/G.E.C. manufacture and an additional 25,000 lb/hr boiler have been installed. The maximum demand from the ore plant, supplied by this station, is 3·5 MW.

Three of the outgoing circuits feed 1,000 kVA, 11 kV/415 V transformers which supply the 415 V board in the main substation. From this board, six outgoing feeders are taken through air circuit-breakers to the crusher and screen houses and other services. Two more of the 11 kV outgoing circuits supply 1,500 kVA, 11/3·3 kV transformers, which in turn feed a five-panel 3·3 kV board in the main substation equipped with spring-closed oil circuit-breakers. From this board two supplies are taken to the ore crusher house and coke rod mill house substations, which are interconnected. Of the remaining outgoing supplies from the 11 kV board, one is taken direct to the main sinter fan house to supply the 2,720 h.p. motor at 11 kV, two supply 750 kVA, 11 kV/415 V transformers at the substation adjacent to the distribution bunkers, and three feed 1,250 kVA, 11 kV/415 V transformers at the main sinter plant substation. All 3,300 V and 415 V switchboards, with the exception of that in the substation near the distribution bunkers, are equipped with Castell interlocks to prevent inadvertent paralleling of the E.M.E.B. system with the Stanton Ironworks network, since these boards have duplicate supply feeders from separate switches on the 11 kV board.

The main contractors for the principal sections of the plant were Mitchell Engineering, Ltd. (crushing plant); G.E.C. and Fraser & Chalmers (bedding plant); Moxey, Ltd. (screening plant and conveyors); and Huntington Heberlein & Co., Ltd. (sinter plant, sinter materials stockyard and coke crushing plant). Civil work was carried out by the F. C. Construction Co., Ltd., Derby. Electrical contractors for the main sections of the plant were the Dalyte Electrical Co., Ltd., the Electrical Equipment Co. (Leicester), Ltd., and Watson-Norie, Ltd. The main power distribution cabling was carried out by British Insulated Callender's Cables, Ltd. The suppliers of elec-

Equipment in the main plant substation includes, left to right, 3·3 kV switchgear, l.v. gear controlling the crushing section supply, an auxiliaries board and the duplicate busbar 11 kV switchboard

trical equipment and plant included the following:—Switch and contactor gear—Reyrolle, Switchgear & Cowans, Allen West and Contactor Switchgear; motors—English Electric, B.T.H., G.E.C., Laurence, Scott & Electromotors and Crompton Parkinson; power transformers—Electric Construction Co., Ltd., and Brush Electrical Engineering Co.; intercommunication equipment—Tannoy; control station panels—Allen West and Field & Grant; weighers—Richard Simon and Davy-United.

Acknowledgment is due to the Stanton Ironworks Co., Ltd., for permission to publish this article and for assistance in its preparation, also to Huntington Heberlein & Co., Ltd., for details of the sinter plant.

NEW RADIOCHEMICAL CENTRE LABORATORIES

TWO new laboratories were inaugurated on 4th May at the Radiochemical Centre, Amersham, by Sir Cyril Hinshelwood, O.M., President of the Royal Society. The buildings are part of a programme to enable the Centre to meet the rapidly growing demand for radioactive products for both industrial and medical use. Since the last facility was opened in 1957, the sales of radioisotopes have increased by 75 per cent.

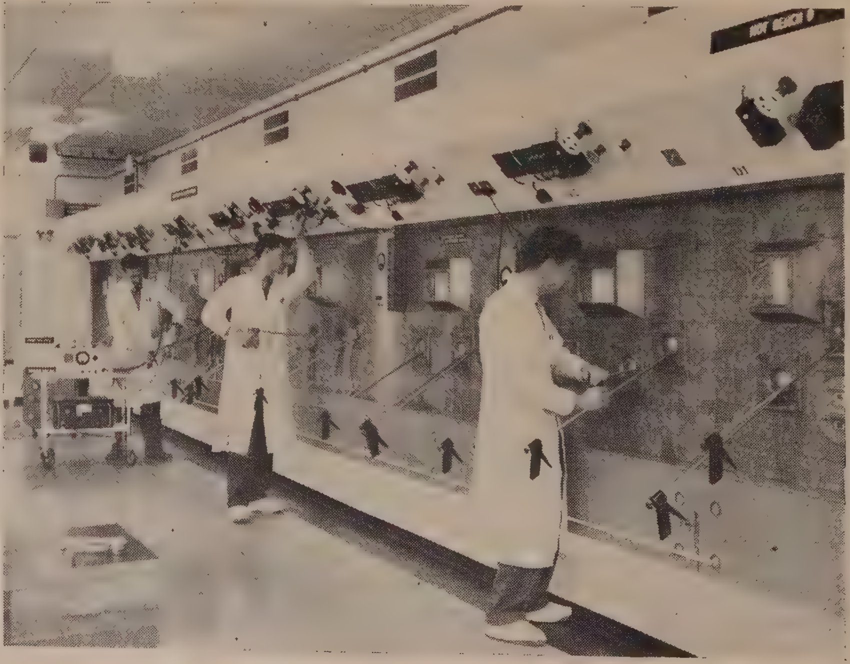
The new laboratories are particularly concerned with making compounds labelled with carbon-14 and tritium and for chemical work with radium and other natural radio elements. The two buildings, which cost £278,000 and have a total floor area of some 30,000 sq ft, are joined by a central plant room at first-floor level which provides common services, and each is planned for future extension. Both are artificially ventilated by air ducts carried within the roof and floor spaces, and both have separate drainage systems dealing with radioactive effluent.

The Organic Laboratory, which has an area of 15,000 sq ft, deals with carbon-14 and tritium. Both these isotopes are of relatively low toxicity and neither emits penetrating (gamma) radiation. Accordingly no heavy screening is necessary. The instrument rooms are without windows to reduce temperature variations.

The Alpha Laboratory is for work with radium and other naturally-occurring radio elements, which are not only highly toxic and therefore need the most rigorous containment, but may also emit most penetrating gamma radiations and so require heavy screening and remote handling equipment. The laboratory has therefore been planned on one floor only and its centrepiece is a block of four "hot benches," which are screened with 3 to 4ft of concrete and up to 10in of lead. Each bench is 50ft long and accommodates a system of interconnected reaction boxes. The work is handled by mechanical manipulators and is viewed through lead-glass windows up to 18in thick. A remotely-controlled electric trolley enables active materials to be conveyed quickly and safely between the boxes which are constructed of glass-reinforced polyester resin to prevent corrosion.

Other facilities in this building include a "frogmen's room," with associated control and decontamination rooms, in which radioactively contaminated equipment can be serviced by operators working in pressurised air suits. There are also two laboratories for work with pure alpha-emitters such as polonium. All reaction boxes in the Alpha Laboratory are connected through filters to a separate exhaust system which discharges to air at 75ft above ground.

The consultants for the electrical and mechanical engineering were G. H. Buckle & Partners, the general contractor was Jesse Mead, Ltd., and the electrical service installations were carried out by N. G. Bailey & Co., Ltd.



One of the "hot benches" in the new Alpha Laboratory

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses not necessarily for publication. Responsibility connot be accepted for the opinions expressed by correspondents.

Floor Heating and Radiator Systems

WITH reference to Mr. A. C. Hazel's remarks on electric underfloor heating, I am amazed at the fear shown by many that this form of heating may make other systems redundant. Like many others, when counting costs, he mentions only cost of fuel and smugly ignores the fact that the cost of the installation of electric floor heating is very much less than other methods and the interest on the money saved could cover the additional cost of fuel. He also conveniently forgets to mention the high cost of maintenance which is *nil* in the case of electric floor heating. Also, where boilers are required, there is the rent of the boiler room and fuel storage room, the use of radiators which invariably collect dirt and breed germs, cause dirty marks on walls above, add to the cost of decorating and use valuable room space. With underfloor heating all this is avoided.

His remarks that it has been found wanting in other countries arise from the fact that when tried by them it had not advanced to present standards and the cables used now were at that time unheard of. Also, today the Americans are using air conditioning which, if you can afford it, is certainly more efficient and costly than any other system. Anyone who has visited buildings where floor heating has been properly designed and installed, with thermostatic control, is soon convinced by the enthusiastic residents that electric floor heating is here to stay and other forms of heating will die a natural death, even as gas lighting did some years ago when the gas companies tried to convince users that electric light was costly and dangerous; today they use it in their own offices. A. J. SPARKS.

FROM the letter of Mr. Hazel in your issue of 29th April it is evident that a revision of approach and strategy is needed. I will not now go into the debatable point raised by Mr. Hazel in paragraph four of his letter, but will content myself with the following:—

In July, 1959, a semi-detached house was completed and occupied. It is fitted with underfloor electric heating (8·4 kW), a modern electric cooker, refrigerator, washing machine, and the usual electrical appliances used today in an up-to-date home. The underfloor electric heating was brought into circuit on 10th October, 1959, and by 9th April, 1960, it had used 5,512 kWh. This is an average of 668 kWh per kilowatt of heating installed, and the average weekly cost is 14s 8d.

This is a field test and it provides interesting and useful information. We also know from our experience that if the occupation of the house changed, the results could be vastly different. It will therefore be seen that Mr. Hazel's statement of 1,500 kWh per winter season per kilowatt of heating installed is unusually high, although I readily admit there could be cases where the conditions were such that this would be the result.

In his third paragraph Mr. Hazel does British people an injustice, as it is my experience that when they come to see me about electrical installations they are extremely well-informed; generally they have already acquired an immense amount of information relating to solid fuel and oil heating, and their approach usually is along the following lines:—(1) Will the installation require apparatus in the rooms? If so, what will it look like? (2) Will the installation be efficient? (3) What will it cost to run?

Since the war we have lived through an economic revolution, resulting in a changed approach to our affairs, and it is necessary for all of us to adjust our attitude to these things as quickly as possible.

Elton, nr. Peterborough. L. HOULDRIDGE.

MR. HAZEL'S letter prompts me to reply if only to ensure that his constantly reiterated opinions on heating are not accepted as facts for lack of a dissenting voice.

It may be true that a hot water floor heating system is more flexible than an " off-peak " electric one but true only in an insignificantly minor degree. To claim that it is " under continuous thermostatic control " and that " the heat input balances the heat output " is to overlook the thermal storage capacity effect of the concrete floor in which the hot water pipes are buried. Does any intelligent engineer really believe that the heat output *to the room* from a hot water floor warming system would be quickly altered even if the temperature of the water circulated through the pipes were instantaneously raised or lowered?

The claim that floor warming is popular because the people who use it are people with little or no experience of other forms of central heating is just Mr. Hazel's opinion. Mine is that its popularity is due to the fact that many people, in the full knowledge of the advantages and disadvantages of other methods of heating, prefer it.

It is true that in theory, at least, a more flexible heating system would be better able to cope with sudden changes in the weather, but practice shows that the advantage is more theoretical than otherwise and if flexibility is needed I would far sooner have a high-temperature radiant heater, a convector, a tubular heater or a fan heater than an oil-filled radiator.

I question whether the " tailored " radiator under the window is such a great asset, particularly in domestic buildings where in winter the windows are usually covered by curtains early in the evening. Complaints of window downdraught with electric floor warming are rare.

I wonder whether Mr. Hazel realises that in 99 cases out of 100 domestic electric floor warming is used to provide background heating and is topped up by the extremely flexible electric fire which gives the added comforts of high-temperature radiation and a focal point to sit round. I fail to see that to use an oil-filled radiator instead of the electric fire would be any improvement.

The idea of field tests to establish the relative consumption of various forms of heating is attractive at first sight, but it bristles with difficulties as anyone who has atttempted such work will confirm. To measure the overall temperature of a house is difficult enough: to measure the comfort given by a heating system is well nigh impossible. It would be helpful if Mr. Hazel would suggest in precise detail how such tests should be conducted, what factors should be measured and how the results should be assessed.

As to the suggestion that the electricity supply industry should fill in its valleys with electric water heating and the other ideas Mr. Hazel puts forward, I can assure him that these things have been carefully considered. Incidentally, the idea of interlocking a cooker with a water heater and a space heating circuit is quite attractive, until one realises that diversity has very much the same effect with no cost or bother at all.

Finally, a word why the Scandinavians, the Swiss and the Americans do not use electric floor warming. My contact with the Swiss electricity supply industry has shown me that they have very little use for electric heating of any sort, but apart from this the main reason is that these countries have considerably lower outside temperatures than we, with the result that it is not possible, in spite of building insulation, to get sufficient heat from the floor at an acceptable floor surface temperature. The fact that these countries go in for higher temperatures, which should not be confused with a higher standard of comfort, accentuates the difficulty.

London, W.C.2. E. M. ACKERY,
Senior Technical Officer,
British Electrical Development Association.

I HAVE read various letters by Mr. Hazel, but none containing more mis-statements than his letter in your issue of 25th March. Although I feel he is to some extent "trailing his coat," I would like to reply to some of his remarks.

As a heating engineer I certainly cannot agree that floor heating is more expensive to run than a radiator system. The term "radiator" is a misnomer because this type of appliance emits a large proportion of its heat in the form of convection currents. Because of this, if the heated area is lofty or has above-average air changes, a considerable increase in running costs can be expected over a floor heating installation which emits the major portion of its heat in the form of radiation and produces the desirable characteristic of a reduction in air temperature with height above floor level.

Mr. Hazel has forgotten the considerable thermal storage effect in any concrete floor, however heated.

Floor heating is enjoying a tremendous success obviously because, if properly designed, it does its job. My experience with floor heating applied in office blocks, where the most exacting requirements have to be met, is that the client invariably recommends the method.

One gathers from his comments that Mr. Hazel's only requirement in any building project is that the architect should include for a multiplicity of windows to suit Mr. Hazel's radiators.

With regard to running cost, comparisons based on cost per kW installed become meaningless if the load installed is in excess of the heat requirements of the building. Where comparisons are made on a proper basis floor heating will always prove the most economical as regards installation costs, running costs and redecorating costs.

Of course there are many ways of improving the supply authorities' load factor, and all these methods will help to produce ultimate reductions in electricity charges for all classes of supply.

Taking Mr. Hazel's letter as a whole, whilst I would agree that research into various heating systems is always worth while, one comes to the conclusion that it savours somewhat of sour grapes.

Leeds. M. BOLSER, A.M.I.E.E.,
Technical Director, Thermoduct, Ltd.

Questions of Precedence

ON a number of occasions I have been involved in lengthy arguments over the order and precedence attached to membership of various technical institutions and would like to receive your views on this matter. For instance:

(A) Do affix initials granted by a United Kingdom "Chartered" Institution take precedence over

(i) Those affix initials granted by Commonwealth institutions created by Royal Charter ?

(ii) Foreign institutes such as the American Society of Mechanical Engineers or the American Institute of Electrical Engineers, etc. ?

(iii) British Institutes not incorporated by Royal Charter ?

(iv) The affix initials granted by Chartered Institutions authorised for non-corporate members ?

(B) Does promotion from one grade of membership to a higher grade change the order of precedence, i.e.

(i) Assuming a person was A.M.I.E.E. and A.M.I. Mech.E. or (ii) A.M.I.C.E. and A.M.I.E.E. then

(*a*) would the person in (i) on being granted full membership of the Institution of Mechanical Engineers place the initials M.I.Mech.E. before A.M.I.E.E. likewise ?

(*b*) would a person on becoming a full member of the I.E.E. be entitled to place M.I.E.E. before A.M.I.C.E.?

(C) Does full membership of a Commonwealth Chartered Institution take precedence over associate membership of a U.K. Chartered Institution, i.e.

(i) Would full membership of the Institution of Engineers (Australia), (New Zealand), (India) take precedence over associate membership of a U.K. Institution, namely, the I.E.E., I.Mech.E., etc.?

(D) What is the position of a Fellow of the Royal Society of Arts, which appears to be the oldest institution founded by Royal Charter ?

(E) What is the position of a full member, associate member, etc., of a non-chartered institution ?

Many arguments have been advanced by various individuals who appear to be of the opinion that irrespective of the grade of membership, the initials are placed after one's name in the order in which these have been obtained. Others do not agree with this procedure and I feel that surely there is some protocol concerning this matter.

Calcutta. A. G. M. TWINING.

BRITISH CONTRACTORS OVERSEAS

NADI

The front of the new terminal building showing a temporary floodlighting pole

international airport

By **W. F. PARKER**, M.I.E.E.*

This article, the fifth in the series dealing with the activities overseas of British electrical contractors,† is devoted to a single contract—that carried out at an airport in the Fiji Islands on the United States–Australia route which has recently been extended to accommodate the largest jet airliners

ON the international air routes from Australia to the United States of America via Honolulu lies a group of British islands, the Fiji. In recent months, the airport services at Nandi (locally called Nadi, but pronounced Nandi) have been considerably extended and modernised, and the runways have been resurfaced and extended for landing the world's largest jets by day or night.

The work has been carried out through the offices of the South Pacific Airport Group consisting of Great Britain, New Zealand, Australia and the United States. Civil engineering work was carried out by Taylor Woodrow (Overseas), Ltd., under the administration of the Ministry of Works, New Zealand. The electrical sub-contractors, operating the furthest yet from their home base, were Troughton & Young, Ltd., of Knightsbridge, London.

There are two runways, the largest for international use being 10,900ft long. Each has full night-landing facilities, the main runway being equipped with a Calvert approach system with high- and low-intensity fittings, and medium-intensity runway lighting all with full automatic brightness control. The subsidiary runway, mainly intended for local aircraft, has its own low-intensity approach lighting system and low-intensity runway lighting both with automatic brilliancy control. Because of the hills surrounding the airfield, the subsidiary approach lighting spreads out into the sea in Nandi Bay, and a new angle-of-approach system has been incorporated.

An 11 kV ring main distribution system from private diesel generating plant covers six outdoor substations and

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* Technical Director, Troughton & Young, Ltd.

† Earlier articles appeared in the *Electrical Review* of 4th March, 18th March, 1st April and 15th April.

Approach lighting on 03-21 from 12,700ft with the trench open for additional wiring for "Omni Reds." The posts have been knocked about where natives tie their animals. A path had to be cut through sugar cane for installation work to proceed

two indoor substations which provide for the whole of the electrical services in administrative premises, terminal buildings, petrol installations, staff housing, etc., as well as airfield lighting.

In addition to the foregoing services, taxiway lighting, apron floodlighting, street lighting and communication services have been installed, as well as the usual construction lights, location beacons, wind indicators, etc.

Polythene insulated p.v.c. sheathed 3 kV cables have been used for all the interleaved runway and approach lighting services which are operated on the now-accepted series principle using individual isolating transformers for each fitting. All equipment is of British manufacture and the airport services are necessarily scattered over a very wide area making photography a difficult task. However, the photographs reproduced show the apron with temporary floodlighting; a section of the street lighting; and some of the main runway approach lighting taken through sugar plantations.

The complete system is pushbutton controlled from a modern mimic diagram desk type console in the control tower. The electrical contract was completed in eighteen months and operational flights were maintained during the whole period.

Showing some street lighting at the rear of the terminal building and the new freight shed on the right

Swedish 400 kV Network

By GUNNAR JANCKE*

Author's summary of a lecture given at a meeting of the Supply Section of the Institution of Electrical Engineers on 11th May entitled " The Development of the 400 kV Network in Sweden "

THERE are no domestic sources of fossil fuels in Sweden whereas an abundant supply of relatively cheap water power is available. Unfortunately, 85 per cent of the water power sources are found in the northernmost part of the country, while the main centres of population are in the south. At present, consumption per head is about 4,300 kWh annually and some 3,000 MW is transmitted from north to south, mainly on a 400 kV network. The first line of 600 miles was commissioned in 1952, and there are now 2,000 miles of 400 kV lines with a length of 900 miles between the extreme terminal points. The installed transformer capacity amounts to about 10,000 MVA. It is estimated that within the next 20 years the rise in demand will be such that 8,000-10,000 MW will have to be transmitted over an average distance of 500 to 600 miles.

Hitherto, the most important problems in planning have been related to the stability, the insulation level and the radio disturbances. Several measures have been taken to improve stability conditions. The lines are provided with twin conductors, which reduces the reactance by about 25 per cent and simultaneously reduces corona losses and radio interference. For reduction of the transmission reactance the best and cheapest method is, however, to use series capacitors. Hitherto, 600 MVAr has been installed in five 400 kV plants and other plants are under construction. Auto-connected transformers are used exclusively in the receiving-end stations.

In step with the increasing transmission, it has proved necessary to increase the size of the individual power lines and transformers. New lines are constructed for an optimum load of 800-1,000 MW and transformer banks of the same magnitude are installed.

The short-circuit power at the 400 kV busbars now amounts to a symmetrical maximum of about 12,000 MVA and it is estimated that it will increase to nearly 20,000 MVA. On the low-voltage side of the transformers it is calculated that a maximum of 12,000 MVA will be obtained at 220 kV and 8,000 MVA at 130 kV. At the generator busbars and on the tertiary side in the receiving stations, that is to say, at 15 to 20 kV, more than 4,000 MVA is obtained in certain cases. No measures are usually taken to reduce the short-circuit power, since a low reactance is desirable from considerations of stability and for limiting the voltage rises in abnormal operation.

Insulation Level

The choice of the insulation level depends on the conditions which exist in normal service and also the overvoltages which may be set up within the system itself or which may be of atmospheric origin. A minimum requirement is that internal voltage rises must not cause a breakdown in operation. The internal overvoltages are set up when changing over from one form of operation to another, and they consist partly of the voltage rises at the operating frequency when interrupting a loaded line, along a line connected at one end, and in sound phases in the case of a single-phase earth fault, and partly in transient phenomena and switching overvoltages from the circuit-breakers. The latter overvoltages are superimposed on the voltage rises at the operating frequency. The line length, the available short-circuit power and the load on the line play decisive roles.

In the first stage, the insulation level of 1,775 kV was chosen for all station equipment. The line insulation corresponded to a surge withstand voltage of 1,580 kV and a one-minute withstand voltage of 715 kV in rain. It has been possible to lower the insulation progressively in step with the increase in short-circuit power in the network, the improvement in the properties of the lightning arrestors and the availability of non-restriking circuit-breakers. The transformers are impulse tested with a full wave and are protected by lightning arrestors. The lines are equipped with two earth wires.

Lightning Faults

Atmospheric overvoltages are ignored in the choice of insulation. The isokeraunic level averages 11. Hitherto, the lines have been subjected to 0·18 lightning faults per 100 miles per year. The atmosphere is very clean and it is only in the vicinity of the Swedish west coast that an increase of the creepage path is needed. The voltage distribution along the insulator chain is improved by a grading ring.

Radio interference is insignificant. The present lines have a maximum field strength of 39·4 kV/in at the conductor surface. This will be appreciably reduced in the new lines with heavier conductors. On the occurrence of earth faults in the 400 kV lines relatively large electromagnetic forces may be induced in telecommunication lines running in parallel because of the poor conductivity of the ground. Protective measures must therefore be taken and this is done almost exclusively on the disturbed side.

The 400 kV lines require about 900 kVAr per mile for charging. For the whole network 1,800 MVAr is required. Shunt reactors for about 1,000 MVAr have been installed and have been connected in units of 60 or 40 MVAr to the generator busbars or the tertiary windings of the transformers. New reactors will be connected directly to the 400 kV side. In addition, 400 MVAr in the form of synchronous machines is available in the receiving stations. With full load on the network, the latter consumes more reactive power than generation provides. Shunt capacitors have been installed on an extensive scale. These are usually placed close to the load centres.

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* Swedish State Power Board.

At heavy loads the voltage at the receiving end is allowed to drop to 380 kV while 400 kV is maintained in the power stations. Investigations have been undertaken relating to the choice of the voltage for future installations and these have resulted in a decision to continue to use 400 kV. The technical problems encountered in this network vary with the course of time. The load will be doubled in 10 to 12 years, which necessitates the construction of more and more lines with a constantly increasing loading capacity. Planned lines will carry 800 to 1,000 MW per single-circuit unit. Transformer banks consisting of single-phase units or three-phase transformers are used, the size of which is limited only by the transportation facilities available. The stability problems are more easily overcome and the demands on insulation are lowered, whereas the short-circuit power rises.

E.R.A. ANNUAL LUNCHEON

THE annual luncheon of the British Electrical and Allied Industries Research Association was held at the Savoy Hotel, London, on 4th May, preceded by the thirty-ninth annual general meeting at which the annual report of the E.R.A. for the year ended 31st December, 1959,* was presented.

Proposing a toast to the Association, the Minister of Power, Mr. Richard Wood, said that research was essential if electrical expansion was to continue. The continuously rising demand for electrical energy was a welcome indication of the country's rising standard of living. However, provision of the necessary generating capacity and increased transmission and distribution facilities presented formidable problems. Various aspects of these problems were being tackled energetically by the research organisations. Some developments were best tackled by single firms but several problems called for co-operative effort. He concluded by saying that it was essential for an association such as the E.R.A. to keep its feet on the ground. It was financed by hard-won contributions and the contributors wanted value for their money. On the other hand, it was important to have a background of fundamental research particularly in so dynamic an industry.

Speakers at the luncheon (left to right): Sir Leslie Gamage, the Minister of Power (Mr. R. Wood) and Mr. O. W. Humphreys

The response was made by Sir Leslie Gamage, president of the Association, who said that at no time in our history had the need for research been more urgent than it was today. In the research field in Great Britain we always seemed to be in an age of scarcity. Either we were woefully short of talent or of money. Despite Government help, the provision of funds fell largely upon the shoulders of industry, but conditions made it increasingly difficult for industry to find these resources. Industry was viewing with alarm its very narrow margin of profit, in many instances irrespective of high productivity, and many organisations were wondering how long they could continue to meet the growing demands of research out of reduced income. In 1958 the electrical industry was responsible for 52 per cent (over £7 million) of all payments for research to outside bodies. During the same year the E.R.A. spent nearly £499,000. Some might criticise the direction into which the effort had been channelled but there could be no doubt as to the benefits it had conferred on industry as a whole. The Association, he said, deserved every encouragement it could be given.

The health of the president was then proposed by Mr. O. W. Humphreys, chairman of the Council. He said that one lesson they had to learn was how to speed up development. They must foresee difficulties and solve them before the design and production engineer got to work. Thus, they must be able to anticipate all the materials and components they would require in four or five years' time.

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* *Electrical Review*, 6th May, page 866.

Colour Television Demonstration

A DEMONSTRATION of colour television was presented at the Institution of Electrical Engineers on 27th April, when two Frenchmen, MM. R. Chaste and P. Cassagne, described the new Henri de France system. The transmitted pictures of scenes in Paris were "compatible": that is, if fed into a colour receiver they gave a coloured result and, if put into a normal television set, they gave a black and white picture.

Engineers in the French companies responsible for the development of the system, the French Posts and Telegraphs, the Radio Television Française, the British Post Office and the B.B.C., co-operated to set up the radio link which comprised sections of the existing Eurovision network, with additional microwave links of the type used by the B.B.C.

General view of the new laboratories at London Road, Harlow

TELECOMMUNICATIONS RESEARCH

NEW research and development laboratories have recently been completed and occupied at Harlow, Essex, by Standard Telecommunication Laboratories, Ltd., and last week the company held a series of " open days." The scope of the work carried out in these laboratories is most comprehensive and covers the entire field of electrical communications, including systems, components and materials. During our visit we saw demonstrations of many aspects of the company's current research programme in the various physical, chemical and electronic laboratories.

The company was formed fifteen years ago as a wholly owned subsidiary of Standard Telephones & Cables, Ltd. As an associate of the International Telephone & Telegraph Corporation (I.T.T.), it is one of this organisation's three advanced research and development laboratories, the others being in Paris (Laboratoire Centrale de Télécommunications) and Nutley, New Jersey (I.T.T. Laboratories). Operations started at Enfield, Middlesex, but the premises soon became inadequate and several outstations were leased to accommodate small specialised groups.

Waveguide Testing

One of these outstations is at Frogmore Hall in Hertfordshire where there is a substantial stretch of level ground. This was to prove invaluable for propagation testing and also for laying out long stretches of the novel circular, helical waveguide to test its radio wave transmission properties. This led, in January, 1959, to the demonstration of the potentiality of this type of waveguide for carrying television programmes or equivalent information in various forms. The techniques which make this possible include the S.T.L. pulse code modulation method which involves converting all the different types of signal into coded trains of pulses, decoding them again at the receiving end.

The original design and testing of super-high-frequency or microwave radio links for television and multi-circuit telephony were carried out at Enfield and these designs became the basis for the major S.T.C. radio link transmission systems which are now spread throughout the world. Much fundamental research on semiconductors was carried out at the Enfield establishment and one aspect of this work was the now well-known invention of the " silane " process for producing silicon of the highest purity.

The installation, in 1956, of a £50,000 Van de Graaff particle accelerator at Enfield marked the beginning of the company's radio-chemical research at S.T.L. into the effects of irradiation on the properties of materials. Examples which can be quoted are trace analysis and studies connected with the polymeric structure of organic compounds.

Even with its outstations the Enfield establishment was soon found to be too small. Eventually, with the co-operation of the Harlow Development Corporation a new laboratory was built on the eastern boundary of Harlow New Town. The new buildings were occupied towards the end of last year and many of the staff found accommodation in and around Harlow. To carry out its work, S.T.L. now has nearly 300 technical personnel, physicists, chemists, engineers and technical assistants, together with about 100 additional staff.

The laboratories stand in 17 acres of ground and have a floor area of over 100,000 sq ft. A four-storey block facing east accommodates administration, technical directorate, some laboratories and an information centre and large central library. Facing south are a pair of two-storey blocks of electronics laboratories, while to the north there are chemical and physical laboratories and central workshops. Separated from the main building is the radio-chemical laboratory associated with the 2 MeV Van de Graaff accelerator, housed in special buildings.

One of the many features of the laboratories is the electric floor heating system which is used as the main source of warmth, supplemented by convectors. The main reason for choosing electric heating is that it does not contaminate the air, an important requirement where many chemical operations have to be carried out with very high purity materials.

The expansion of S.T.L. which has made the new building so necessary also indicates that these buildings will themselves be outgrown before long. The site and the planning of the layout therefore allow for expansion to the west, where additional electronic, physical and chemical blocks are projected.

I.E.E. Annual Report and Accounts

COPIES of the annual report of the Council of the Institution of Electrical Engineers for 1959-60 and of the accounts for the year ended 31st December, 1959, to be presented at the annual general meeting of the Institution on 19th May, can now be obtained by members of the Institution on application to the secretary.

Left: Mr. Paul Reilly proposing the toast of the Association; on his right is Mr. W. J. Bird. Centre: The president (Mr. D. L. Tabraham) responding; on his left are Mr. R. Baldwin, who replied for the guests, and Mr. C. J. W. Scott, past-president. Right: Mr. J. O. K. Purdy proposing the health of the guests

Lighting Fittings Industry

E.L.F.A. IN NEW GUISE

MANY well-known people in the electric lighting field attended the annual luncheon of the Electric Light Fittings Association at the Tallow Chandlers' Hall, London, E.C., on 4th May when the president, Mr. D. L. Tabraham, was in the chair.

The principal guest was Mr. Paul Reilly, director of the Council of Industrial Design, who proposed the toast of the Association. In the course of his speech Mr. Reilly thanked the industry for its support of the Council and said that lighting fittings were an important part of home furnishing and their design was a yardstick of furnishing design progress. The lighting fittings makers were increasingly adventurous and experimental in their endeavour to meet the developments in architecture. The main problems of the Council of Industrial Design arose from the public's indifference and its tendency to leave choice to other people, and "retrospection," the cult of the antique, although we were as well endowed with modern design talent as any other nation.

In replying to the toast Mr. Tabraham said that a meeting held the previous day was the first under the Association's new constitution—the start of a new E.L.F.A. which still had an important rôle. They had always endeavoured to improve by all possible means the design, quality and performance of British lighting equipment and they had exercised considerable influence in this direction.

Since their formation in 1926 the Association had built up a tradition of stabilised trade and fair conditions; now they had had to give up their trading codes—not because they did not believe that they were beneficial to the trade and the public, but because they were advised that it would be difficult to defend them before the Restrictive Practices Court. But there were still many matters with which they could deal effectively and they had been strengthened by the entry of the A.E.I. Lamp & Lighting Co., Ltd., Atlas Lighting, Ltd., Ekco-Ensign Electric, Ltd., and Philips Electrical, Ltd., whose representatives he welcomed. The wider the Association's representation the more effective it would be and he invited others to join them.

There had been a rapid advance in exports and the industry must not now be regarded as divided between home and overseas business. In this and many other matters, there was a need for communal action; he instanced statistics, technical services, standardisation and the promotion of quality. They also sought co-operation with other manufacturing sections of the industry, the wholesalers, and the contractors and retailers.

Mr. Tabraham expressed his appreciation of the work done during the last two difficult years by Mr. Charles Scott (vice-president), the section chairmen and committees, and the director, Mr. J. H. Campion. He thanked the members for his re-election as president for a further year and said that he was optimistic about the future of the industry and of the Association in its new form.

Mr. J. O. K. Purdey proposed the health of the guests in felicitous terms and Mr. R. Baldwin responded on their behalf.

Radiological Health

A REPORT on the training of radiological health and safety specialists by a committee appointed by the United Kingdom Atomic Energy Authority has been published (H.M. Stationery Office, price 5s 6d). The report makes recommendations about the types of experts needed to deal with health and safety aspects of the use of ionising radiations and radioactive substances. It also covers training procedures for these specialists.

VIEWS on the NEWS

By REFLECTOR

GREAT advances have been made by the Eastern Electricity Board in taking electricity to the rural districts in its predominantly rural Area. Yet there is still an unsatisfied demand and farmers and country dwellers persist in their call to the Board to meet it. It seems strange, therefore, that a correspondent in the *Lynn News and Advertiser* should say that some specialist farmers are thinking that electricity is not a suitable source of power on the farm. They base their opinion upon power failures which have occurred in parts of the Lynn area which they say are by no means rare. Overhead distribution is naturally more vulnerable than underground cables, but the use of the latter for extended rural supplies is not often feasible. Failures of supply have serious results in the case of some farming applications, e.g. poultry rearing, but I should have thought that, generally, the benefits of electricity would outweigh the disadvantages of occasional stoppages and I doubt whether the views reported are very widely held.

* * *

I referred in a recent note to the application by the Central Office of Information of the term " Giant Power " to a 60 MW turbo-generator. This has been seen by a Winnipeg reader, Mr. John W. J. Lewis, who sends me a couple of cuttings from *Electrical Digest*, which describes itself as the news magazine of the Canadian electrical industry. One of these, labelled " Huge Power Supply," illustrates a 450 kVA three-phase transformer (one of two) which is said to be " towering above " a workman. Actually he is squatting and his head reaches half-way up the transformer. The second cutting depicts a transformer substation in a hotel and it is alleged that the incoming power lines are " rated for 750,000 volts capable of carrying 400 amps continuously " which, as my correspondent remarks, is surely a record for any hotel in the world.

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I suppose it is something to do with latitude that while the Spring Meeting of the Scottish Centre of the Institution of Electrical Engineers is being held at Pitlochry from 20th to 23rd May the Summer Meeting of the Western Centre is taking place at Llanwrtyd Wells.

* * *

A member of the Keith (Banffshire) Townswomen's Guild displayed an extraordinarily profound knowledge of the uses of electricity in a " quiz " recently held. As a result she has been chosen (with others) to represent Scotland in the all-Britain finals of the quiz this month. But, in addition, she won an electric cooker which she confessed that she would be unable to use. This was not from any lack of ability—merely a lack of electricity. She explained that her home was remote from the nearest source of supply and there was no prospect of being connected up for years to come. Her small practical acquaintance with electricity was gained some years before the war; she had derived her electrical knowledge from a booklet issued by the North of Scotland Hydro-Electric Board. This almost entitles her to a special extension.

* * *

Tenants of houses owned by the Eastry (Kent) Rural District Council are to be responsible for the renewal of blown fuses in spite of warnings by some members that this might be dangerous: some tenants would probably put in wire with too high a current rating with a risk of fire. While this is true, because many people would not recognise the cause of the blowing of the fuse and cut out the appliance or flex involved, any ban on replacement would cause difficulties both for the tenant and the Council or whoever was responsible for the task. This seems to establish a case for some elementary instruction and a small supply of fuse wire of the correct gauge.

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Live Lines (the official organ of the Electrical Supply Authorities' Association of New Zealand) says that " Waitaki objects to the policy of duplication of electrical services by *other* solid fuels." This authority's electricity appears to be of more substance than is customary.

* * *

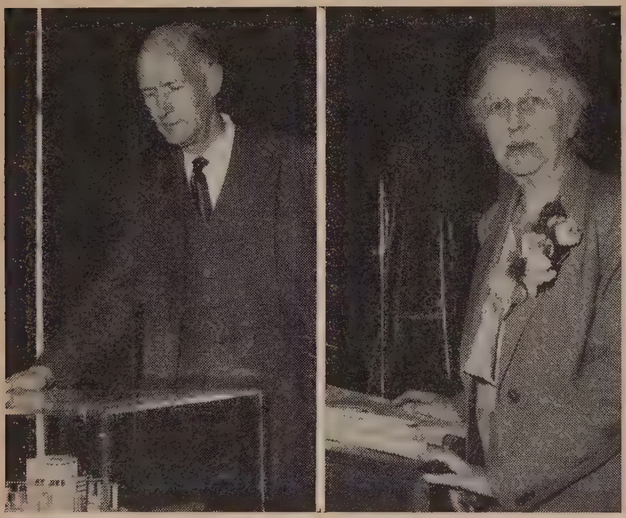
The *Electrical Review* of 13th May, 1910, recorded the formation of a Committee for the Protection of Electrical Interests. The secretary was R. Borlase Matthews (who may be remembered for his rural electrification activities) and a long list of members of the Committee included the names of such well-known men as S. Z. de Ferranti, Hugo Hirst (later Lord Hirst), J. F. C. (later Sir John) Snell, A. A. Campbell Swinton and the Hon. C. A. (Sir Charles) Parsons. The Committee's primary object was said to be " to endeavour to secure united action with a view to the protection and advancement of the commercial and legislative interests of the British electrical industries " and it was quaintly said that " the Committee in its collective capacity starts with neutrality on all contentious matters." Membership was open to " any gentleman connected with the electrical industry and receiving the support of not less than five members."

Electrical Association for Women

SEEBOARD AREA VISITED

MORE than 500 delegates from all parts of the country, representing the 196 branches of the Electrical Association for Women, assembled at Folkestone last week for the 35th annual conference of the Association. Once again the conference was favoured with brilliant weather and this, combined with the efforts and organisation of the South Eastern Electricity Board, was in no small way responsible for its success. The Leas Cliff Hall, the venue for most of the functions, was tastefully decorated for the occasion and an excellent display of domestic electrical equipment, staged by "Seeboard," did much to create the right atmosphere. Refrigerators, cookers, water heaters, cleaners, etc., were on show, as well as an early G.E.C. "Archer" cooker with self-contained cooking vessels and an original Revo "Economy" cooker, the last-named item being a great source of interest.

The first event was a lecture on Tuesday evening by Miss Kay Pennett (Simplex Electric Co., Ltd.), holder of the 1959 Travelling Exhibition, in which she described her recent tour of Australia and New Zealand. The hosts on this occasion were the E.A.W. branches in the London and South Eastern areas, on whose behalf a welcome to the guests was given by Mrs. D. S. E. Thompson, president of the Canterbury branch. Lady Kilmuir, president of the E.A.W., was unable to be present at the official welcome and open session on Wednesday owing to other engagements on her return from New Zealand and her place as chairman was taken at short notice by Miss H. Shaw, chairman of the Association. The director, Miss Mary George, was also unable to attend, owing to indisposition.



Left: Sir Christopher Hinton, chairman of the C.E.G.B., inspecting a model of Berkeley nuclear power station exhibited in the Conference Hall. Right: Miss H. Shaw, chairman, E.A.W., officially welcoming the delegates

The Mayor, Alderman W. M. Harris, greeted the delegates on behalf of the town of Folkestone and this was followed by an official welcome from the South Eastern Electricity Board by Mr. W. R. T. Skinner, deputy chairman. There was a special greeting from Mrs. A. Vos-Warnecke, president of the Dutch E.A.W., who also took the opportunity to present to Miss Shaw a bouquet of tulips. It was agreed later that these should be sent to Miss George with the good wishes of the conference for her speedy recovery.

Sir Christopher Hinton, chairman of the Central Electricity Generating Board, then spoke on "The Amenity Problem as it Affects the Electricity Industry." In his talk he defined amenity as meaning the conditions in landscape which the public as a whole wished to see and enjoy. There was, he said, no doubt that the activities of the C.E.G.B. often conflicted with this amenity and that the conflict tended to grow in magnitude and public opposition to the Board's schemes was increasing. Of the power stations, he said it should be remembered that nuclear stations, which had no coal-stocking areas and no ash-disposal problems, conflicted less with amenity than would conventional stations on similar sites. In connection with transmission lines, the focus of opposition, he said, was mainly local and arose primarily from landowners who did not wish to have pylons on agricultural land and from householders in the immediate vicinity. The advantage of the system, however, was national rather than local and the lines did not normally meet the local demand for electricity. Opposition to power station sites was often by nationally organised bodies although the construction of a nuclear power station brought considerable local advantages.

Sir Christopher then dealt with the basis of the opposition in these two different cases. Considering the financial side of transmission problems, he said that the cost per mile of a 275 kV double-circuit overhead line was £25,000; this compared with £400,000 per mile for underground cables of a similar capacity and there were many technical and engineering problems to be solved before even this could be achieved in practice. The annual capital investment by the C.E.G.B. would be increased by about a half by the undergrounding of transmission, which would ultimately raise the cost per kWh by something like 15 to 20 per cent. He asked whether the industrial and domestic consumer would be prepared to pay this additional cost in order to avoid the use of overhead transmission lines. Perhaps the domestic consumer would, said Sir Christopher, but he thought that the industrial consumer would complain bitterly. He concluded by saying that the electricity industry had given more to amenity in its broadest sense than it had ever taken from it.

During the afternoon Miss Shaw presided at the 27th annual general meeting. She said that during the year emphasis had been placed on the practical construction work of the E.A.W. and the high value set on the advice it gave. It had intensified its work with young people, particularly through the Duke of Edinburgh's award

Right: At the annual general meeting. Left to right: Miss A. S. Lockhart, assistant secretary, E.A.W.; Mrs. W. S. Carty, treasurer, E.A.W.; Miss H. Shaw, chairman, E.A.W.; Miss G. Shaw-Mackenzie, conference secretary; Mrs. Mark Fraser, vice-chairman, E.A.W.

Below: E.A.W. area organisers at the civic reception and dance

scheme for girls. The field of educational awards from the Caroline Haslett Memorial Trust had also been extended and this year, in addition to scholarships in domestic science and electrical housecraft, the Association had awarded a scholarship at Cambridge University. In the absence of Miss Mary George, the annual report was presented by Miss A. S. Lockhart, assistant secretary, E.A.W., who said that the increased public interest in electricity in the home and in careers requiring electrical knowledge had led to E.A.W. participation in more exhibitions than ever before. It was, she said, a healthy sign that while 64 of the Association's 200 branches were over 21 years old and 30 over 25, the number of branches continued to grow. Eleven new ones were formed in 1959.

Dealing with E.A.W. examinations, she said that at the 45th and 46th examinations for the Certificate in Electrical Housecraft for demonstrators, 217 candidates were successful, 25 gaining distinction. The E.A.W. Diploma was awarded to 15 demonstrators, making a total of 553. The number of teachers who held the Diploma was 94. The report showed that there had been an increase of 37 in the number of Home Workers' Certificates awarded and, at the end of the year, the total number was 6,181.

The Cheltenham Silver Jubilee Awards for branch members taking the Home Workers' Examinations were all won by Scottish members. E.A.W. publications now included 20 wall charts and large orders continued to be received from Electricity Boards and from education authorities in this country and abroad. There was also increased publicity for E.A.W. work in the national Press and reference was also made to a special television programme which was devoted to the E.A.W. During the year the Association took part in over 60 exhibitions and indebtedness was expressed to the E.D.A. and the Electricity Boards for their generous assistance. The year had also been one of increased activity at the London headquarters of the Association and the 1,280 inquiries made represented a 25 per cent increase over the previous twelve months.

The adoption of the annual report was proposed by Mrs. G. V. Harrap, London branch chairman, and seconded by Mrs. V. Buxton, Derby branch chairman. Following this the accounts were presented by Mrs. W. S. Carty, hon. treasurer.

During the meeting voting took place for the six vacancies on the National Executive Committee and of the fifteen candidates, the following were elected:—Miss R. Brown, Liverpool; Mrs. Mark Fraser, Harlow; Miss N. Kenyon, Manchester; Miss F. M. Pugh, Torquay; Mrs. E. Trevor Rees, Swansea; and Miss H. Shaw, headquarters.

A civic reception and dance given by the Mayor and Corporation of Folkestone were held later in the evening.

Part of the electrical display in the Conference Hall staged by "Seeboard." An early G.E.C. "Archer" cooker (1905-10) with self-contained cooking vessels (left) and a Revo "Economy" cooker (1930) with plug-in type oven elements (right), are shown with their modern counterparts

Almost all the delegates attended and an excellent cabaret was provided.

At the annual luncheon the following day the chair was taken by Lady Kilmuir. Science and education was the theme of an address by Alderman Commander D. S. E. Thompson, R.N. (retd.), chairman, South Eastern Electricity Consultative Council, and chairman of the Kent Education Committee. Under the old system of engineering training, said the speaker, the engineer knew a great deal about his own work and little about the world in which he lived or the history of his society. The world, however, was filled with people, not machines, and human problems could not be solved with slide rules and log tables. He pointed out that in recent years more and more attention had been paid to the education of the scientist/engineer, as opposed to his specialised training, and today the traditional methods of gaining an education by part-time study was slowly being replaced by a system of full-time courses. The young engineer, he said, combined an education with related industrial training. It was by education that the gap between the scientist and the layman must be bridged, he concluded.

A toast to the guests was proposed by Mrs. G. A. Tatchell, J.P., president of the Gravesend branch, who is retiring from the E.A.W. National Executive Committee after 25 years' service. Mr. H. F. Carpenter, member of the South Eastern Electricity Board and chairman of the Cyprus Electricity Authority, responded.

During the period of the conference delegates were also invited to an " At Home " session at the Seeboard's Folkestone showrooms, where they were able to see a recent E.D.A. film " The Future is Electric." A number of post-conference tours were arranged by Seeboard and delegates had a choice of four visits, including one to Richborough power station.

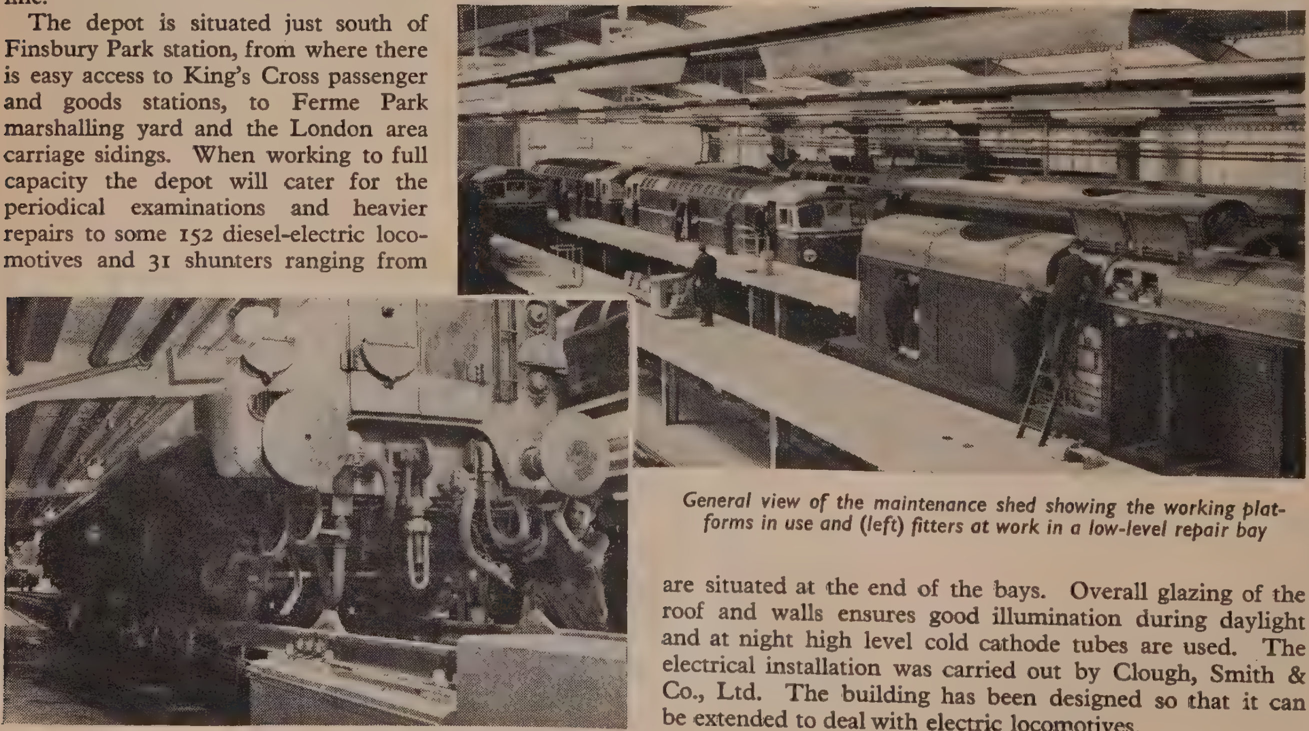
DIESEL LOCOMOTIVE MAINTENANCE

THE inner suburban services on the Great Northern lines from and to King's Cross, Moorgate and Broad Street were fully worked by diesel-electric locomotives at peak times for the first time last summer. After a period during which there were frequent delays due to mechanical failures and other teething troubles there has been in recent months a marked improvement in punctuality. Greater reliability, coupled with accelerated timings and other improvements, are now reaping their reward in increased traffic throughout the Great Northern suburban area of the Eastern Region.

Facilities now provided at the new depot at Finsbury Park should ensure not only first class maintenance of the Type 2 locomotives operating these services but also of the Type 4 and " Deltic " locomotives being introduced to work trains on the East Coast main line.

The depot is situated just south of Finsbury Park station, from where there is easy access to King's Cross passenger and goods stations, to Ferme Park marshalling yard and the London area carriage sidings. When working to full capacity the depot will cater for the periodical examinations and heavier repairs to some 152 diesel-electric locomotives and 31 shunters ranging from 350 h.p. to 3,300 h.p. At present the depot is also being used for daily servicing. Workings of between 140,000 and 150,000 miles a year are being obtained with the main-line locomotives and it is expected that a figure of 200,000 miles a year will be achieved with the " Deltics." (An equivalent steam engine averages 60,000 miles a year.)

The main shed is a steel-framed structure with a single span roof of more than 111ft. It contains six bays—each with room for three locomotives—and the rails are mounted on short tubular columns to allow the fitter unrestricted space above the pits when working on the underside of a locomotive. Another feature of the depot is the permanent working platforms at footplate level from which the uppermost parts of the engines can be easily reached. Battery charging rooms, and electrical and mechanical workshops are situated at the end of the bays. Overall glazing of the roof and walls ensures good illumination during daylight and at night high level cold cathode tubes are used. The electrical installation was carried out by Clough, Smith & Co., Ltd. The building has been designed so that it can be extended to deal with electric locomotives.



General view of the maintenance shed showing the working platforms in use and (left) fitters at work in a low-level repair bay

INDUSTRY AND THE HOUSE

Discussion on the Finance Bill

By **AUSTEN ALBU**, M.P., B.Sc., A.M.I.Mech.E., M.I.P.E.

"THIS is not a Budget so much as an economic abrasive," said Mr. Douglas Houghton, winding up for the Opposition on the second reading of the Finance Bill. He was referring to the nice adjustments of taxation, coupled with the tender pressure of financial control exerted by the hire-purchase restrictions and the Bank special deposits, by which the Chancellor hopes to keep the economy on an even keel.

Mr. Houghton was not the only member to wonder what the effect of such marginal calculations as an increase of tax revenue of £70 million could be on the national economy. Certainly Mr. Nigel Birch, one of the Treasury triumvirate who resigned with Mr. Thorneycroft, found it distressing that we should live all the time so near the edge of the precipice. For him and his friends the only way was a reduction of Government expenditure even if this meant stopping the loans to building societies and those given to the motor and steel companies to persuade them to expand in the areas of unemployment. He also suggested tolls on our motorways and bridges and the forcing of the nationalised industries to do more internal financing, so relieving the Treasury of the task of providing capital for them.

There is no doubt that Mr. Birch spoke for the substantial section of his party who have never concurred in the Prime Minister's acceptance of, at least, part of the Opposition's views on the place of Government in economic planning. Nevertheless, on this occasion these Tory critics were mute, apparently content with their stern expressions of view during the Budget debate. In any case this Finance Bill hardly offered scope for economic debate in the grand style, for fifty of its seventy-three clauses deal with tax administration, many of them with the prevention of tax avoidance. These are matters better understood by lawyers than by the average Member of Parliament, although they are bread and butter to Mr. Houghton who, as general secretary of the Inland Revenue Staff Federation, frequently sends shivers down the backs of his tax-paying colleagues by his expositions of the tax-gatherer's point of view.

Tax Avoidance

He claimed that at least £100 million a year was involved in tax avoidance devices today. The Chancellor himself gave no figure, but his recitation of the methods by which ingenious avoiders operated impressed the House. His first proposal dealt with "hobby farmers" and, in future, unless they can show that their activities are being carried out on a commercial basis and with a view to the realisation of profits they will not be able to set their losses off against their other income. Most of the tax avoidance clauses are designed to ensure that trading profits do not escape liability by being disguised or turned into capital gains. So ingenious are the gentlemen who indulge in these practices that it has not been possible so to frame the law that, between one Finance Bill and the next, they will not be able to find loopholes. The Chancellor has, therefore, been forced to rely on the intention of the taxpayer, who will now have to show that his transactions were carried out for bona-fide commercial reasons. Although not without precedent these new powers for the Commissioners of Inland Revenue have disturbed many, not all on the Tory benches, but detailed criticism has been reserved for the committee stage of the Bill, which promises to occupy many weary hours of the summer for those whose stern sense of duty compels them to attend its proceedings.

Some members think that these matters of tax administration should be separated from the annual Budget and incorporated in a separate Bill. This would have the advantage that the Government could introduce such legislation at any time of the year and so deal promptly with newly discovered methods of tax avoidance. It would also be possible to discuss the details in a committee "upstairs" and not on the floor of the House where members will always insist in discussing taxation itself.

Space Research

The ending of Blue Streak, apart from putting the defence policies of both the Government and the Opposition into the melting pot, has re-aroused interest in a British programme of space research. The Minister of Aviation informed the House that, during the course of his talks with French and German Ministers on co-operation in development and production in the field of aviation, he had told them that it was proposed to invite other European and Commonwealth countries to participate in a joint space programme. He had found considerable interest in the idea. In reply to a question from your contributor he said that the cost of such a programme was now being examined, but he declined to be drawn into making a guess at the figure. Agreement had been reached in principle for the joint development of a vertical take-off aircraft to meet the needs of N.A.T.O. forces and the electronic system required for the air defence of Europe.

In the civil field the other long-term and expensive project awaiting decision is the supersonic jet airliner. Mr. Sandys said that the French manufacturers at present favoured the development of a medium-range supersonic airliner while our manufacturers seemed to think that it would be more economic to go for a long-range aircraft. Mr. Strauss was anxious about the tie-up between the French company Sud-Aviation and Douglas in America and wondered where we came in. Mr. Sandys thought that this agreement was for the development of an advanced type of sub-sonic "Caravelle." He said that he had discussed the problem of a supersonic aircraft with the French Minister of Transport and they had agreed that it was a good thing for firms in both countries to examine it together, which he indicated that they were doing.

With the growth of the Common Market in Europe, American firms are taking increasing interest in making agreements with firms within it and several have now been reported between American and European aircraft firms. Members of Parliament are becoming increasingly aware of the dangers which these developments might represent for British exports.

PARLIAMENTARY REPORT

Water Power and Coal

Referring to the hydro-electric plans of the North of Scotland Hydro-Electric Board in the House of Commons last week, Mr. Nabarro asked whether it was sensible to continue to build dams at high cost in the north to save coal while we were subsidising unemployment in the coalfields in the south of Scotland?

Mr. N. Macpherson, Under Secretary of State for Scotland, said he could not accept that it was a primary purpose of the hydro-electric schemes in Scotland to save coal. The primary purpose had always been to make available a supply of electricity and to develop the economy of the Highlands.

Replying to another question by Mr. Nabarro, Mr. Macpherson said the projects of the North of Scotland Board under construction in 1960-61 would, when completed, produce additional supplies of electricity equivalent to the production from a quarter million tons of coal per annum; and they would add 556,000 kW of capacity at an estimated average cost of £75/kW installed. Up to 30th April last, the Board had spent £194·5 million out of its total maximum borrowing powers of £240 million.

Asked about consultation with mining interests, he said that when the merits of a proposed hydro-electric scheme were examined the comparative cost of alternative methods of production was a prime consideration. Electricity produced from hydro-power cost much less per kWh than electricity from steam power.

A Labour member, Mr. Woodburn, intervened to say that the production of hydro-electricity was not in competition with coal, because hydro-electricity was being used at peak periods when coal-produced electricity would not be economic. There were other ways to help Lanarkshire than by stopping hydro-electric schemes.

Windscale Reactor

Replying to Mr. Lee, Sir David Eccles said the estimated cost of constructing the advanced gas-cooled reactor at Windscale was about £9 million. It would be capable of producing useful quantities of steam, and the project included generating plant. It would be the prototype of larger-scale reactors for use in the civil power programme. It offered prospects of considerable reduction in the cost of nuclear power, and its main function would be to test fuel elements and provide experience of the operating conditions and physics of this advanced system.

Decca Navigational System

A suggestion that Britain might " go it alone " with the Decca landing aid, following its rejection by the Council of the International Civil Aviation Organisation, was rejected by the Minister of Aviation, Mr. Sandys, who said that if they joined an international organisation they must respect its decisions. Mr. Sandys made it clear, however, that he was convinced that equipment such as the Decca system, which continuously traced the aircraft's course on the pilot's chart, was superior to the D.M.E. and V.O.R., which provided the pilot only with range and bearing to a beacon, and he said they would continue, in the interests of safety, to urge the need for a course tracing system, on the Decca principle, particularly in areas of dense air traffic.

Forward-Scatter Risks

Fears were expressed by a number of M.P.s about the dangers of intense radio-frequency radiation that might be produced from forward-scatter stations. The Secretary of State for Air, Mr. George Ward, said as far as the five N.A.T.O. forward-scatter stations being set up in the United Kingdom were concerned, the small areas within which radiation was above the recommended safety level would be fenced off. Special arrangements would be made for the operating and servicing staffs.

Future of Hong Kong Companies

In reply to Mr. Thornton, the Colonial Secretary, Mr. Macleod, said the Hong Kong Electric Co., Ltd., and the China Light & Power Co., Ltd., with Government consent, were now exploring all possibilities to find a formula which might cover most of the recommendations of the Electricity Supply Companies Commission short of nationalisation. The aim was to ensure that the Government was given the maximum degree of control consistent with retention by the companies of incentives to efficiency and expansion. The Hong Kong Government had indicated that any such formula must be presented against a background of the ultimate amalgamation of the two companies and integration of their generating capacity.

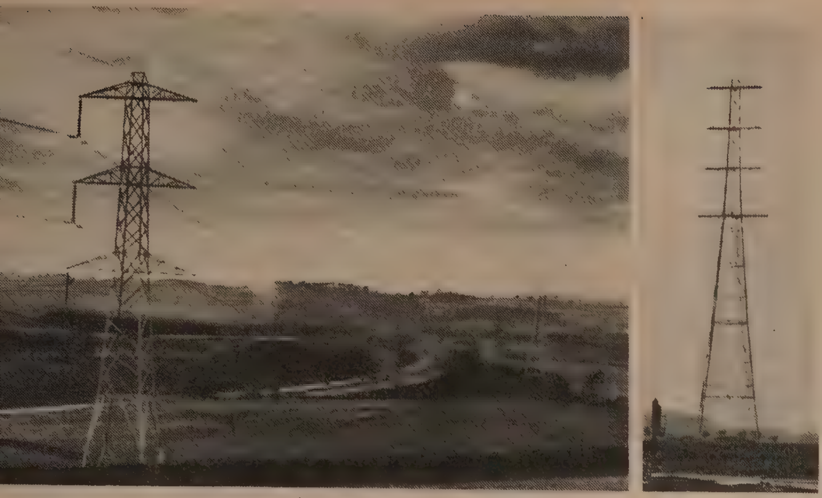
Control of Radioactive Substances

The Radioactive Substances Bill, which will make permanent the control of waste originating from the Atomic Energy Authority nuclear sites and provide new control for other users, was read the third time in the House of Commons. The Parliamentary Secretary to the Ministry of Housing and Local Government, Sir Keith Joseph, said that as far as the other users were concerned some time would be needed to prepare to enforce the Bill and it would therefore be some little time before the appointed day could be named.

The three principles with which the Bill started—national control, two-tier control and the creation of a national disposal service—still remain. During the committee stages the Minister gave a series of assurances that though control would be central and not local, local authorities and other public bodies would be kept fully informed about what went on and would be consulted whenever their interests were directly involved.

The Minister of Housing and Local Government, Mr. Brooke, said he had nothing further to report about the progress of international agreement on symbols, but the Government were anxious to see action taken.

The Opposition moved an amendment which would have taken control out of the hands of the Minister and placed it with a body to be known as the Radioactive Substances Control Authority, whose members would have wide experience in the disposal of radioactive wastes and the organisation of workers connected with the nuclear industry. The amendment was rejected.



Part of the 275 kV line, near the recently opened Lancaster by-pass, and (right) one of the 245ft high towers at the crossing of the River Ribble

Supergrid Construction

COMPLETION OF HARKER-PENWORTHAM LINE

IN April engineers of the Construction (Cables and Lines) Division of Associated Electrical Industries, Ltd., finished the 92-mile Harker-Penwortham 275 kV steel tower section of the supergrid after two years' work. The contract was originally awarded to W. T. Henley's Telegraph Works Co., Ltd., in 1957, before they joined A.E.I.

The route of the line is from the Central Electricity Generating Board's substation at Harker, four miles north of Carlisle, across Cumberland, Westmorland and Lancashire to Penwortham substation, two miles west of Preston. Harker substation was already connected by a 275 kV double circuit line to Stella, near Newcastle, and another double circuit line from Scotland. It receives part of the power generated by the nuclear power station at Chapelcross, near Annan, and this increase of generating capacity necessitated the reinforcement of the line to the south. Work commenced in April, 1958, construction being divided into two sections. The consulting engineers for the contract were Messrs. Kennedy & Donkin.

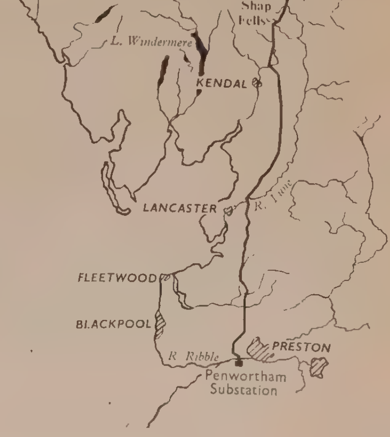
One of the more difficult stretches of terrain was that crossing Shap Fells, where the route is over twelve miles of open moorland, much of it trackless. At some tower sites it was necessary to lay a 24in gauge rail track, using skips to convey the concrete for the foundations and flat bogies for other materials. At other more or less inaccessible sites a crawler tractor was used. In this area a depth of peat overlies the rocky subsoil and a number of the tower foundations had to be modified. These, with four towers on the southern section at the crossing of the River Ribble, were the only exceptions to the installation of normal concrete pyramid foundations throughout the line.

As the Ribble is used by ocean-going vessels it was necessary to allow a 160ft conductor clearance to high water level under all conditions and, with a span length of 720ft, two specially designed towers of 245ft overall height were necessary. The foundations of these towers were piled at each leg position and mass concrete pile-caps, each weighing 87 tons, were placed. Footings were set individually, using a beam type template to support the foundation steelwork accurately in position during concreting. On the north bank of the river a considerable depth of peat was found and two other towers were given piled mass concrete foundations, with tie beams connecting the four footings.

The conductors for this line are of 0·4 sq in copper equivalent steel-cored aluminium, two parallel conductors being used for each phase. They are held parallel at 12in centres by aluminium spacers. Although only one circuit was strung, 6,250 of these spacers were installed individually by a linesman in a "bosun's chair" riding along the conductors. The earth-wire is of 0·175 sq in copper equivalent s.c.a. Some sections were strung by pulling conductors in the wake of pilot wires, using a multi-drum winch. Across one wooded valley, tree-cutting was prohibited and the span was strung by pilot wire, using a guide-line fired by a rocket across the valley. The crossing of the River Lune, in the last section of the route to be completed, was also accomplished by means of a rocket-fired line (see *Electrical Review*, 8th April, page 717).

At altitudes greater than 1,000ft above sea level on the Shap Fells the standard span of 1,200ft was reduced to 1,000ft to allow for the severe weather conditions often experienced in this exposed area. At Shap the line reaches its maximum altitude of 1,420ft.

The line, 92 miles long, is carried on 442 towers of Blaw Knox design as standard on the Board's 275 kV lines. The towers are suitable for eventual uprating to 380 kV. The foundations involved the placing of 14,500 tons of concrete. Some 640 tons of aluminium and 250 tons of steel went into the manufacture of the conductors and earth-wire. Over 14,000 tension and 19,000 suspension discs have been used in the porcelain insulator sets—30 discs for each duplicate tension set and 18 units for each single suspension set.



Route of the Harker-Penwortham line

INDUSTRIAL NEWS

"Outer Seven" Tariff Regulations

The European Free Trade Association (Origin of Goods) Regulations, 1960, were published last week (S.I. 780, H.M. Stationery Office, price 4s 6d). These regulations are to give effect to the provisions of the Stockholm Convention for determining eligibility for Area tariff treatment. The schedules to the regulations differ in minor respects from the schedules printed in Cmnd. 906-1 (published in November), because the latter have been the subject of minor amendments since agreed among the signatory states.

The Convention area is defined as Austria, Denmark, Great Britain with Northern Ireland, the Isle of Man and the Channel Islands, Liechtenstein, Norway with Spitzbergen, Portugal with the Azores and Madeira, Sweden and Switzerland.

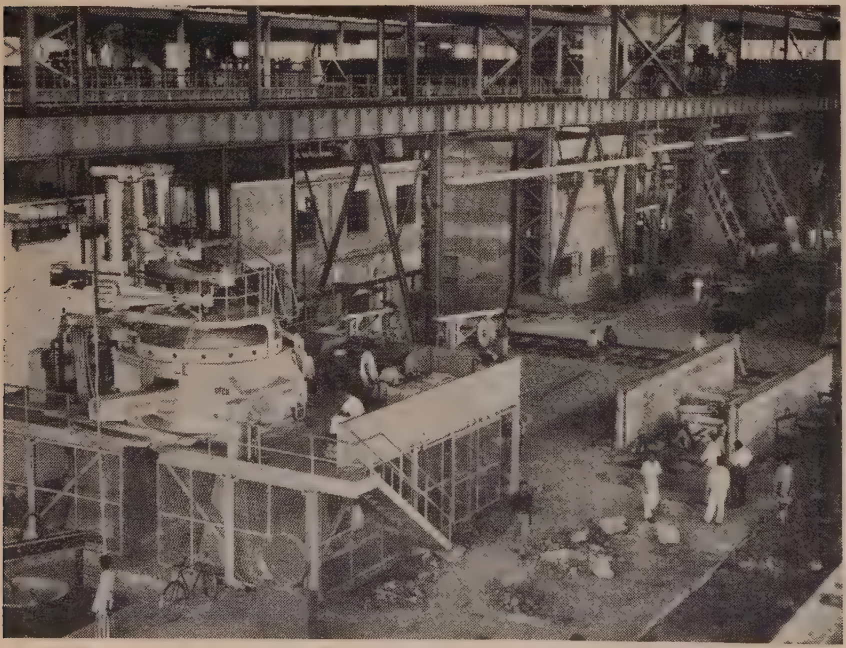
Convention rates of duty are the reduced rates of duty which will be introduced for goods which are grown, produced or manufactured in, and consigned from a place in, the Convention area. A Treasury Order providing for Convention rates of duty for goods imported into the United Kingdom will be published shortly, to become operative from 1st July, 1960. The introduction of Convention rates of duty will necessitate certain adjustments in the drawback arrangements, which will also be published shortly, to become operative from 1st July. Information on the procedure to be followed in order to claim the benefit of the Convention rates of duty on goods imported into this country is published in Customs Notice to Importers No. 73, obtainable from the Secretary, Customs and Excise, King's Beam House, Mark Lane, London, E.C.3.

Reprints of the notes for the guidance of U.K. exporters on how to take advantage of the opportunities offered by the Convention for increased trade with the Convention area, which were published in the *Board of Trade Journal* of 29th April, are obtainable from the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, London, W.C.1, or any Board of Trade Regional Office.

European Co-operation in Appliances

As part of its policy of helping to provide a bridge between the countries of the "Outer Seven" and the Common Market, the British Electrical and Allied Manufacturers' Association arranged a meeting in London this week between domestic electrical appliance manufacturers from the two economic groups.

The Common Market manufacturers, represented by the Conseil Européen de la Construction Electro-Domestique (C.E.C.E.D.), of which the B.E.A.M.A. is a member, held a series of meetings in London on Tuesday and Wednesday on technical, commercial and financial matters. Representatives from Sweden, Switzerland, Austria, Denmark and the United Kingdom (with Finland as an observer) also met in London on Monday at the suggestion of British manufacturers, to discuss the possibility of co-operation between manufacturers in the two European groups. They later met the president of the C.E.C.E.D. (M. Coite, of France) to discuss detail, and representatives of the two groups also attended a dinner given by the C.E.C.E.D. on Tuesday evening.



Work in progress on the electric arc furnace in the steel foundry at the Durgapur Steelworks, West Bengal, which is being built by "Iscon," the British consortium of engineering and electrical companies

Gresham Coming-of-Age

To mark the twenty-first anniversary of Gresham Transformers, Ltd., an informal garden party was held on Monday. Set in the delightful surroundings of Monksbridge, Sunbury-on-Thames, the home of Mr. J. P. Coleman, chairman and managing director, the event was a great success and approximately 150 guests attended. Among those present were several of the company's original customers who first placed orders in 1939.

Speaking at the ceremony, Mr. C. Ian Orr-Ewing, Civil Lord of the Admiralty, recalled his earlier associations with Gresham and remarked how the company had grown since that time. They had now branched out into many new fields, but the transformer side was still the "bread and butter" of the company. Mr. R. Gresham-Cooke, M.P. for Twickenham, proposed a vote of thanks to the speaker. Afterwards, guests were invited to the factory at Hanworth, where a small but interesting display of the company's products was on view.

Industrial Lighting

The British Lighting Council has published a handbook on "Industrial Lighting," the object of which is to show how the ability to work depends upon ability to see, and this in turn depends upon matching the type and method of lighting to the particular characteristics of the material being processed. It suggests how lighting can assist in providing bright, cheerful surroundings which stimulate workers to do their best and adopt habits of tidiness and cleanliness.

The question of cost is discussed in relation to output, spoilage, labour turnover, and other factors of vital concern to factory management.

Figures showing the extent to which improved lighting has led to increased production are quoted for a number of cases representative of factory experience and of Government investigation.

A number of special lighting applications are described—for materials with surface polish or with matt surfaces, for inspection by fluorescence or in silhouette, for colour matching and grading, the use of polarised light, lighting for dangerous and difficult situations, and so on. There are a number of appendices giving a code of minimum recommended values of illumination, minimum mounting heights, local and localised lighting data, and tables showing hours of lighting in a year. A bibliography refers to other relevant publications.

The handbook sets out the problems involved in the provision of suitable and sufficient lighting in industry, it describes the techniques of their solution and the equipment which will be used, and it indicates the returns which investment in better lighting can produce. A number of excellent illustrations are included. The handbook (86 pp.) is priced at 5s post free and can be obtained from the head office of the Council at 16-18, Lancaster Place, London, W.C.2, or from the regional offices.

Lighting London University School of Pharmacy

The General Electric Co., Ltd., has supplied nearly all the lighting fittings for the new London University School of Pharmacy in Brunswick Square, W.C.1. The building was officially opened by H.M. Queen Elizabeth, the Queen Mother, on 27th April. The building has six storeys, five and the basement being devoted to laboratories. A total of 340 warm white, triple tube, cold cathode fittings, some having special ribbed "Perspex" side diffuser panels, light these laboratories and private examination rooms. A particular feature of the decor in the entrance, dining and assembly halls is the coloured ceilings, a perfect background for the specially designed electroliers.

In the assembly hall, also used for social functions, there are twelve nine-light chandeliers suspended from square framed baskets, each containing four 3ft "Osram" warm white fluorescent tubes. One large, inverted and decorated, glass bowl pendant fitting hangs from a large circular brass ceiling plate in each of the side alcoves of the assembly hall. All the lighting fittings are finished in satin brass, and the main lights are connected on a dimmer circuit. In the balconied dining hall, the assembly hall style of lighting is continued.

The lighting in the tiered lecture theatre consists of fourteen recessed 10ft cold cathode fittings of special design with "Perspex" louvres, together with recessed spot lamps. It is controlled from a panel at the lecturer's desk. G.E.C. standard tungsten fittings are used in the corridors and general areas of the school. The majority of the fittings in the building were specially designed by the architect, Mr. Herbert J. Rowse, F.R.I.B.A., of Liverpool. The electrical installation was carried out by Higgins & Cattle, Ltd., London.

G.E.C. chandeliers in the dining hall of the new School of Pharmacy, London University

Expanding Production of Capital Goods

Production in the engineering and electrical goods industries in February was 13 per cent more in volume than a year earlier. Provisional estimates by the Board of Trade, which make allowance for the different incidence of the Easter holiday, suggest that production during the first quarter of this year was also 13 per cent higher than during the corresponding period of 1959. In contrast with early 1959 when expanding production in these industries was mainly in the sectors producing consumer goods, growth in recent months has been in capital goods.

The flow of net new orders in January and February expanded vigorously and, despite increased production, orders on hand rose sharply. Since order books began to grow at the end of October, orders on hand have increased by 10 per cent.

Ferranti Air Traffic Control Computer

A Ferranti "Apollo" computer will go into operation at the Scottish air traffic control centre at Redbrae, Prestwick, early in the spring of next year for processing flight information, initially on an experimental basis. Up to 100 aircraft may be flying the North Atlantic at any one time and must conform to agreed separation standards, which are 30 minutes longitudinal flying time between aircraft, 2° of latitude and 1,000 or 2,000ft in height, according to the flight level. The computer will print out flight progress strips relating to each aircraft and, if it is found that separation standards are being infringed, details of this will be printed out.

The computer consists basically of three cabinets, each 6ft high, 22in wide and 19in deep, containing racks of printed packages which carry out the arithmetic and control operations, the programme and data store and the power supplies, and input/output logic for control experiments. A fourth contains electronic equipment developed by the Ministry of Aviation in conjunction with the Radio Research Establishment for cathode-ray tube dsiplays. Each cabinet is equipped with cooling fans, and the power consumption of the complete equipment is about 2 kW.

A.S.E.E. Year Book

A number of new features are included in the technical section of the 1959-60 Year Book of the Association of Supervising Electrical Engineers, which has just been published. These include articles on common faults in electrical installations; fault-finding in fluorescent lamp circuits; motor faults and their diagnosis; the transistor in industry; earth-fault loop-impedance testing; electrically-operated petroleum service pumps; and automatic controls for oil burners applied to industrial boilers.

The existing material, which includes recent interpretations of the I.E.E. Wiring Regulations, lightning protection, and wiring capacity of trunking, has been considerably extended and revised. The technical section is again preceded by matters relating to the Association, including particulars of its constitution, its officers, objects and rules. There is also a section devoted to the Electrical Engineers' Exhibition.

The edition, which for the first time has varnished covers, has been completely re-edited and now has 212 pages with 23 tables and 14 illustrations and diagrams. It is obtainable from the Association at 23, Bloomsbury Square, London, W.C.2, price 5s including postage.

Dunlop-Oldham Australian Company

It is announced by Dunlop Rubber Australia, Ltd., and Oldham & Son, Ltd., Manchester, that a jointly owned sales company is to be set up in Australia under the title of Dunlop Oldham Pty., Ltd. The new company will market the Oldham PG double sleeve tubular traction and other industrial batteries throughout Australia. The batteries will be manufactured at Artarmon, Sydney, N.S.W., where the Oldham Co. has installed new and special plant and equipment to provide complete manufacturing and technical service. The new set-up provides for close liaison and co-operation between the two companies in manufacture. The organisation of distribution and after-sales service is based upon the Dunlop sales organisation throughout Australia.

Osram Air Race Cup

The Osram Cup, which for the past four years has been presented by the General Electric Co., Ltd., to a class event winner in the national air races, will this year be awarded to the overall winner in the Royal Aero Club's new Business and Touring Aircraft Competition, to be held at Shoreham Airport on 20th and 21st May. The G.E.C. is also contributing £525 towards the total of £925 prize money.

Caroline Haslett Memorial

The Management Committee of the Caroline Haslett Memorial Fund (Electrical Section) invite applications for the award of a travelling exhibition in domestic electrification. Application should be made by 1st June. Further particulars are given in our advertisement pages today.

Board's Machine Accounting Centre

When the South Wales Electricity Board commenced operations in 1948 only a few accounting machines, most of them old, were inherited from the pre-vesting undertakings.

Following recommendations of a working party set up to consider the mechanisation of stores accounting an order was placed with International Computers & Tabulators, Ltd., for a 550 electronic calculator, two tabulators, and the requisite ancillary equipment. At the same time work started on the construction of a new wing at the Board's head office at St. Mellons, to house the installation in its entirety. The construction of the new wing was completed in 1959 and the installation of the machines was completed earlier this year. On 22nd April the new wing was formally opened by Sir Cecil Weir, chairman of International Computers & Tabulators, Ltd. Introducing Sir Cecil, the chairman of the Board (Mr. W. A. Gallon) stated that commencing in 1962 the work of billing all the Board's consumers would be transferred to the machine accounting centre and that eventually the installation would handle payrolls, creditors' payments, capital cost accounts, and expenditure and revenue returns. After the ceremony the chairman of the Board entertained the guests to lunch.

The new machine accounting centre of the South Wales Electricity Board

Ether Langham Thompson in Italy

As the first step in a policy of expansion in the export field, Ether Langham Thompson, Ltd., announce the formation of a new subsidiary company, Ether Langham Thompson (Italiana), Ltd., with offices and factory at Via Bisleri 19, Milano. The new company will market and manufacture products of the subsidiary companies of Ether Langham Thompson, Ltd. Mr. J. Langham Thompson is chairman, Dr. Bignardi and Dr. Scandola, joint managing directors, and Mr. F. W. Coulling and Mr. F. B. Duncan, directors.

Lead Consumption

In its 1959 review the Lead Development Association sets out the consumption of lead for all purposes during the past decade. From these figures it is seen that in 1950 out of a total consumption of 328,123 tons the cable industry accounted for 86,163 tons and battery manufacture for 27,518 tons as metal and 23,655 tons as oxides. Peak consumption was reached in 1955 when cables took 110,505 tons and batteries 32,006 tons as metal and 28,762 tons as oxides. Last year the total consumption was 345,903 tons (cables 96,148 tons; batteries 31,551 tons as metal, 27,826 tons as oxides).

Employment in the Cable Making Industry

Recommendations have been made by the Joint Industrial Council for the Electrical Cable Making Industry on the employment of young persons. The Council, after pointing out that the number of young people leaving school at 15 years of age will show a marked increase in the next seven years, states that while recruitment in some electric cable making establishments has continued satisfactorily, in others recruitment has almost ceased. The Council considers that the industry should now seek to recruit a reasonable number of young people, preferably boys, who do not desire or are not selected for apprenticeships or technical training and it sets out the principles to be followed in providing employment.

Precipitators for Steelworks

The Steel Company of Wales has awarded Simon-Carves, Ltd., the contract for gas-cleaning plant on two 400 ton open-hearth furnaces which are being installed at Port Talbot; the contract includes provision of equipment for dust conveying and disposal. Three 3-zone electro-precipitators to deal with about 140,000 natural cu ft/min from the oxygen-processed furnaces will recover the dust in a dry state, and the resultant stack emission will be not more than 0·04 grain per n.cu ft.

Simon-Carves, Ltd., has also received a contract for fume removal and gas cleaning plant for a hot slab scarfing machine from the South Durham Steel & Iron Co., Ltd. This machine will form part of the new plate mill being installed at South Works, West Hartlepool. An electro-precipitator, gas storage vessel, interconnecting ducts, fan and stack comprise the plant, which will deal with 80,000 n.cu ft/min of fume to give an emission of 0·02 grain per n.cu ft.

Crane Controls for Steelworks

Brookhirst Igranic, a company in the Metal Industries Group, is to supply crane controls valued at £120,000 to the new Spencer works of Richard Thomas & Baldwins at Llanwern, near Newport, Monmouthshire.

Works Holidays

The Banbury and Handsworth Works of the Northern Aluminium Co., Ltd., will be closed from 22nd July to 8th August, and the Rogerstone Works from 29th July to 15th August.

The works of British Insulated Callender's Cables, Ltd., will be closed for the annual holidays as follows:—Erith, Helsby and Prescot Works, from 16th July to 1st August; Melling Works, from 22nd July to 6th August; Anchor Works, Leigh, from 2nd to 9th July and 10th to 17th September; Willenhall Foundry, from 23rd July to 6th August.

Educational

Pamphlets are obtainable from the South East London Technical College, Lewisham Way, S.E.4, of full-time courses for the I.E.E. Part III and/or the I.Mech.E. Part III examinations, a two-year telecommunication sandwich course, and an engineering sandwich course.

Trade Announcements

Mr. J. M. Anderson has been appointed sales agent for Scotland and Northern Ireland for the **Stella Lamp Co., Ltd.**

Johnson, Matthey & Co., Ltd., announce that they have adopted the name "Silver Star" to cover their entire range of precision silvered mica capacitors.

S.L.R. Electric, Ltd., is moving its head office on 27th May to Welbeck Works, South Harrow, Middx., and is opening a new factory at Cranbourne Road Industrial Estate, Potters Bar. The telephone number of the head office (Byron 327315) will be unchanged.

Mr. W. S. Mallinson has joined the staff of the Scottish branch of **Berry's Electric, Ltd.,** as an outside representative.

The new offices of the **George S. May International Co., G.B.,** were officially opened last week at Villiers House, Strand, London, W.C.2. This company specialises in the field of business management.

The **Revo Electric Co., Ltd.,** announces that sales of its new product, the Revo "Jobber" $\frac{5}{16}$in electric drill and home workshop equipment, are to be extended on 1st May to include the West Country and South Wales.

The trade counter of **Wholesale Electrical Components, Ltd.,** has been moved to Clerkenwell Green, London, E.C.1 (telephone: Clerkenwell 7752).

Change of Name

H. W. Carter & James, Ltd., wire goods manufacturers, have changed their name to Wirax Wirewares, Ltd.

VISIT TO UNIDARE WORKS, DUBLIN

MEMBERS of the staff of Thermodare (Great Britain), with agents and representatives, headed by Mr. E. C. Green, the general manager, recently paid a visit to Dublin as guests of the parent company, Unidare, Ltd. During a tour of the Unidare works at Finglas, under the guidance of Mr. P. H. Greer, director and general manager, the party were shown the manufacture of Thermodare storage heaters and other appliances, as well as the production of cable, transformers, water pumps, aluminium foil and polythene sheet. Apart from the works inspection, conferences and discussions, there were a number of social occasions. Presentations for outstanding salesmanship were made to Mr. D. Lee (Eastern Counties) and Mr. H. Dennell (Yorkshire).

The works of Unidare, Ltd. (formerly the Aberdare Electrical Co., Ltd.), consist of six factories, on a 60-acre site, which have all come into being in the last ten years. The British subsidiary, Thermodare, started in 1952 when Mr. Green and Mr. C. J. Wheeler began to organise the sales of off-peak storage heaters in this country. The business grew steadily especially as in 1953 Mr. Green's efforts to secure the removal of purchase tax on the heaters were successful and the sales consequently received a great stimulus.

In 1955-56 floor heating was embarked upon and soon after infra-red heaters were added. An export business was commenced but now Unidare has formed a separate organisation for the purpose.

The Unidare works at Finglas, Dublin

PERSONAL AND SOCIAL

News of Men and Women of the Industry

After an emergency meeting on 3rd May the president of the European Organisation for Nuclear Research (C.E.R.N.), M. François de Rose, announced the appointment of **Mr. J. B. Adams,** at present director of the Proton Synchrotron Division, as interim director-general of the organisation. This appointment became necessary as the result of the recent death in an aeroplane accident of the late director-general, Professor C. J. Bakker. Mr. Adams was recently appointed director of the new Controlled Thermonuclear Research Establishment in the United Kingdom, but will remain with C.E.R.N. until later this year.

Mr. P. Sydney

Mr. P. Sydney, at present manager of the Suffolk Sub-Area of the Eastern Electricity Board, has been appointed manager of the Chilterns Sub-Area in the place of the late Mr. R. F. Winder, whose death was reported in last week's issue.

Mr. Sydney received his technical training with Edwards & Armstrong, Ltd., Stroud, and was appointed assistant district manager of the Wessex Electric Co. in 1931, becoming personal assistant to the managing director of Edmundsons Electricity Corporation, Ltd., in 1936. He returned to the Wessex Co. in 1939 as the district manager and became the general manager of the Cambridge Electric Supply Co. in 1941. In 1948 Mr. Sydney was appointed the commercial officer of the Fens Sub-Area of the E.E.B. and became manager of the Suffolk Sub-Area in 1952.

The following appointments are announced by the International Rectifier Co. (Great Britain), Ltd.:—

Mr. D. D. Harding has joined the company as sales engineer for the London area. He was previously with the General Electric Co., Ltd., in the Research Laboratories, Wembley, dealing with the design of transistorised equipments. **Mr. G. W. Fisher** has been appointed sales engineer for the Midlands and is resident in Birmingham. He was previously engaged on the design of control and static switching equipment with Lee Beesley, Ltd. **Mr. G. A. Osborn** is responsible for customer liaison in the South East of England. He was previously in the semiconductor research laboratories of Mullard, Ltd. **Mr. M. H. Ley** is appointed sales administration manager and is responsible for the sales office at Oxted. He was until recently sales manager for Westool, Ltd.

Mr. W. R. Baron, who was responsible for planning the Oxted factory and, until recently, acted as sales manager, has now transferred to the American Corporation in Los Angeles.

Awards of grants by the Paul Instrument Fund Committee have been made as follows:—£2,500, with the probability of further grants totalling up to £3,000, to **Dr. J. H. Sanders,** university lecturer and demonstrator in physics, Clarendon Laboratory, Oxford, for the construction of an optical maser, and £3,000 to **Mr. H. W. Gosling,** lecturer in the Department of Engineering, University College of Swansea, for the construction of an instrument for checking the stability of the standard ampere.

Mr. F. V. Pipe, O.B.E., A.M.I.E.E., Derby, has recently retired from the East Midlands Electricity Consultative Council, and **Mr. A. H. Hockley,** Derby, has been appointed a member.

Miss V. Goldsbrough

The Caroline Haslett Memorial Trust has awarded a scholarship at Cambridge University to **Miss Valerie Goldsbrough,** from Wingate, Co. Durham, who will read for the mechanical sciences tripos at New Hall College with a view to a career in electrical engineering. This university scholarship, which is worth £450 a year for three years, is the first of its kind to be awarded by the Electrical Section of the Trust.

The Trust has awarded five scholarships to enable the holders to take a domestic science training before engaging in a career in the electrical industry. These have been awarded as follows:—Miss A. V. Morvan, Ullingswick, Herefordshire, to Gloucestershire Training College of Domestic Science; Miss A. M. Darbyshire, Stockport, to Manchester College of Housecraft; Miss B. J. Leetham, South Godstone, Surrey, to Gloucestershire Training College of Domestic Science; Miss C. E. Ostler, New Southgate, London, N.11, to the Northern Polytechnic, Holloway Road, N.7; and Miss L. Tejani, Uganda, to a London College. Miss Tejani is at present employed by the Uganda Electricity Board.

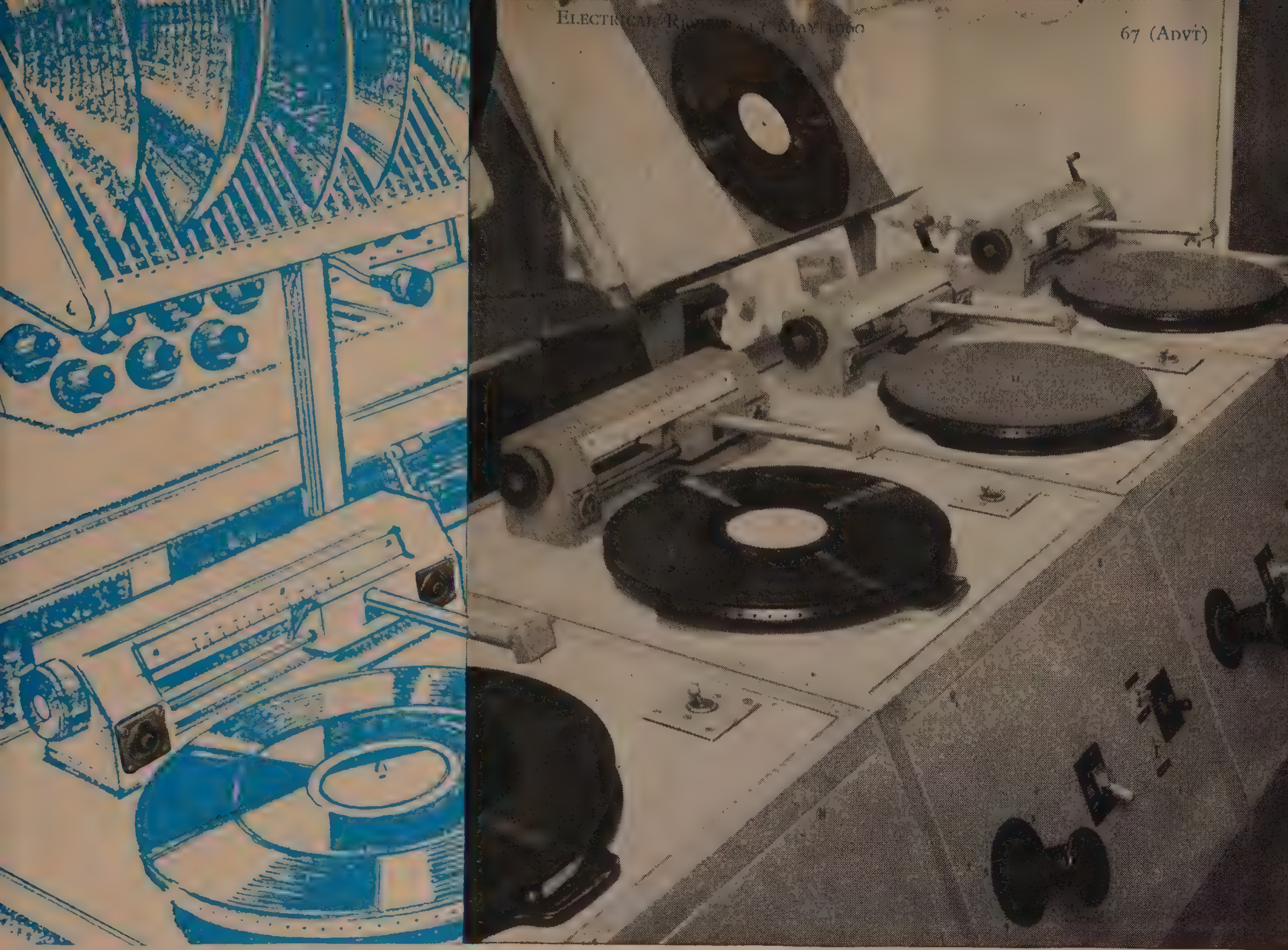
Mr. W. F. Parker

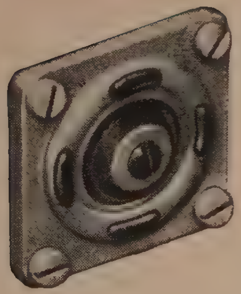
Mr. W. F. Parker, M.I.E.E., who has contributed the article on the Nadi Airport, Fiji (page 913), is technical director of Troughton & Young, Ltd. He is a Lancashire man and was educated at the Birkenhead and City of Liverpool Technical Colleges. After a period of training with Lever Bros. he joined Messrs. Stinton Jones & Partners, consultants, in 1934. Two years later he became deputy chief engineer of the Bective Electrical Co. and chief engineer in 1941. He took up his present position in 1945. Mr. Parker is also a director of Tyrad Electric, Ltd. He was national chairman of the Association of Supervising Electrical Engineers in 1951-52 and a member of the I.E.E. Council from 1954 to 1957.

Mr. H. C. R. Trewman, A.M.I.Mar.E., A.M.I.E.E., has been appointed marine sales specialist to the Brush Electrical Engineering Co., Ltd. He was previously in the Marine Engineering Section of the Metropolitan-Vickers Co., in Manchester. He will be responsible for the sales of all Brush products for use afloat both in the United Kingdom and in co-operation with Hawker Siddeley Brush International, Ltd., for export sales.

Mr. R. Armstrong, M.A., LL.B., has been appointed secretary of the Dumfries and Galloway Area of the South of Scotland Electricity Board in succession to **Mr. W. Hunter,** who was

[*Continued on page* 931





quietly doing a job

The photograph above shows a gramophone turntable bank in the Sound Control Room at the B.B.C. Television Studios, Lime Grove.

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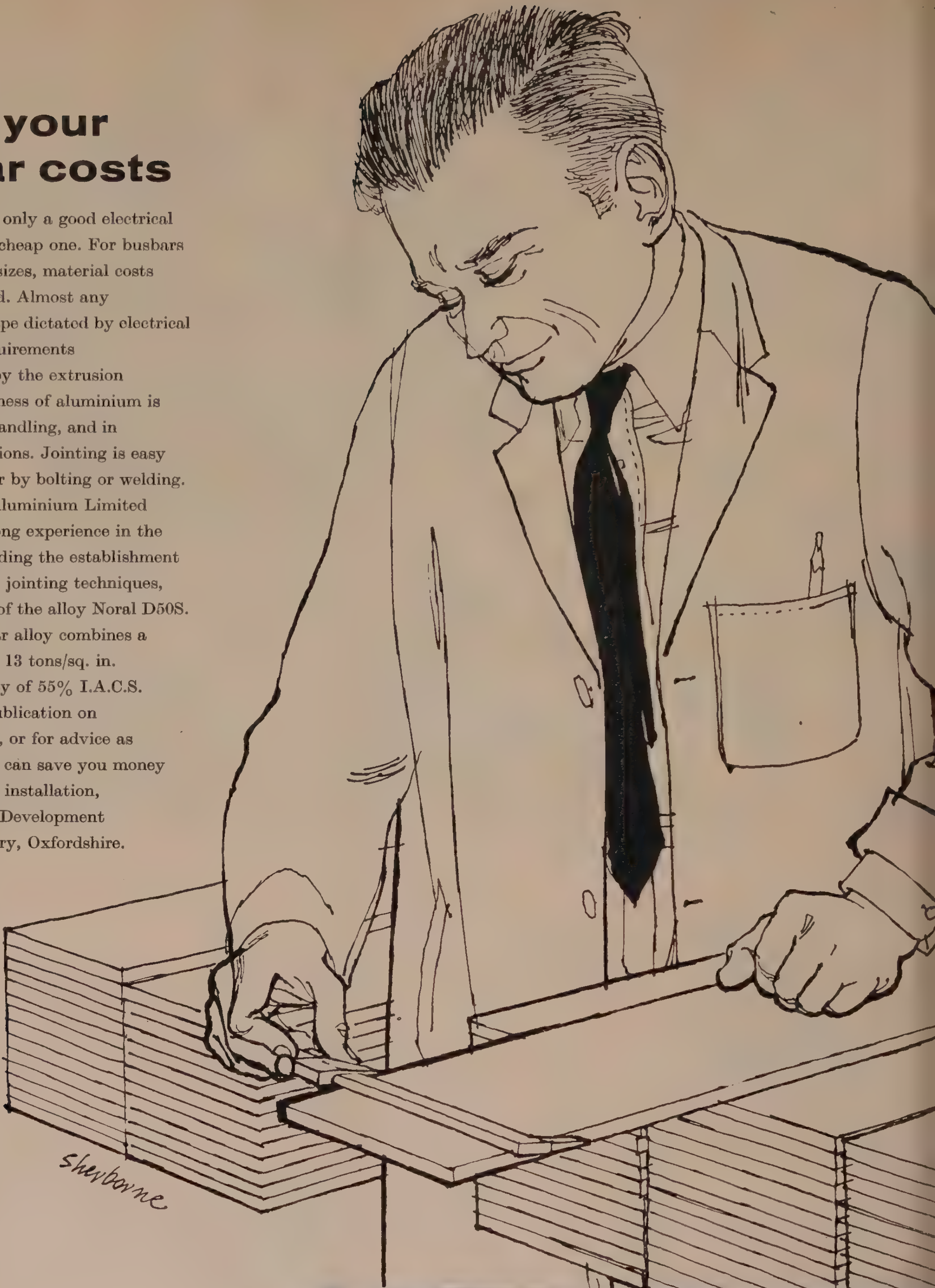

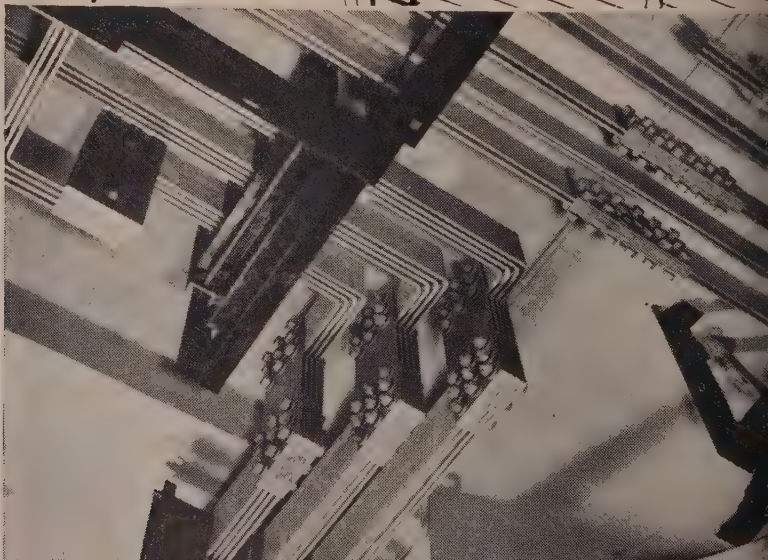

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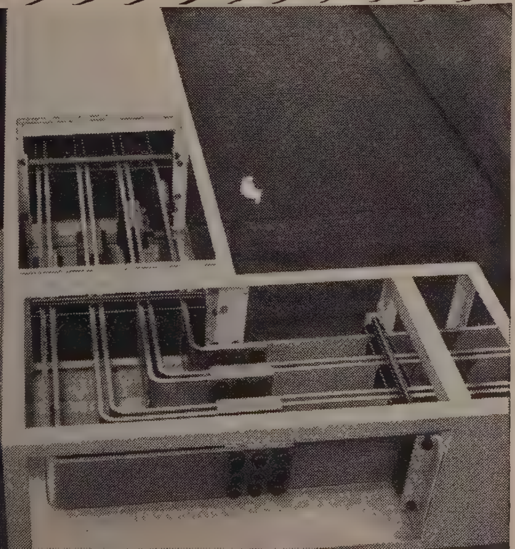

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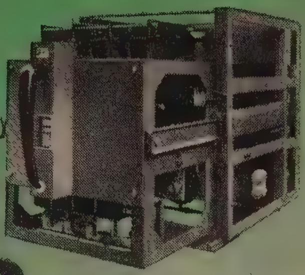

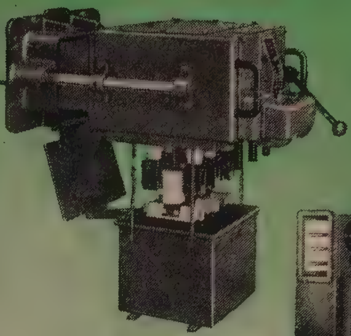

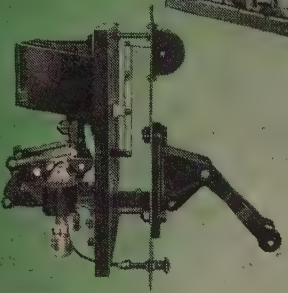

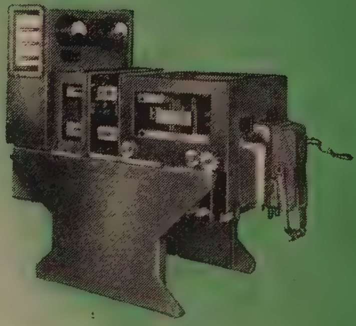

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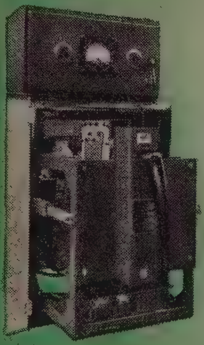

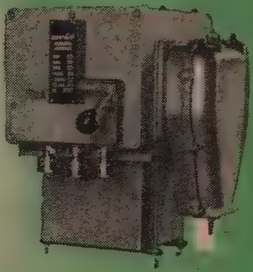

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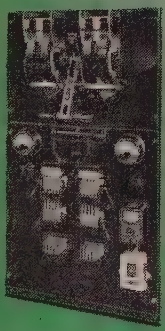

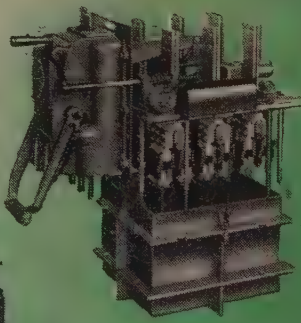

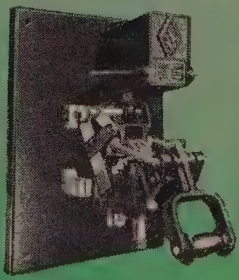

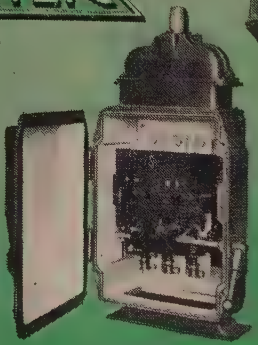

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WORKS – AMERSHAM COMMON, BUCKS

A Member of the Metal Industries Group

PERSONAL AND SOCIAL (*continued*)

recently appointed to a similar position in the Stirling Area. Mr. Armstrong has been principal legal assistant in the Secretary's Department at the Board's head office, Glasgow, since 1957. He will take up his new duties on 1st June.

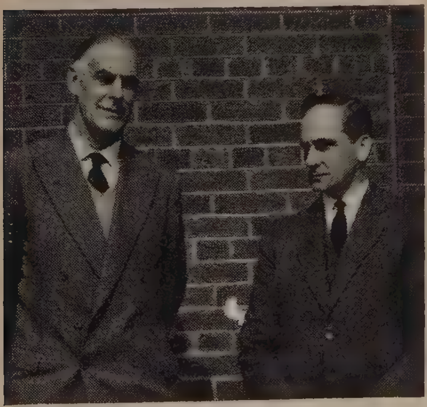
Mr. L. H. Dale, managing director of Dale Electric (Yorkshire), Ltd., is in Canada where he is visiting existing agents and will appoint new agents for territories not already covered. He returns to this country on 7th June.

The national finals of the **Electrical Industries National Golf Championship** will be held in Birmingham on Monday, 26th September, and not 21st September as stated in our issue of 29th April. The London area finals will be held on Thursday, 14th July, at Denham Golf Club.

Mr. T. C. Howell

Mr. T. C. Howell has joined the Sperry Gyroscope Co., Ltd., as general sales manager of the Industrial Division at Brentford. Mr. Howell has had some twenty-five years' experience in the electronic and allied industries, holding appointments in several nationally known organisations. He is a member of several S.B.A.C. committees and panels on guided weapons and components.

Mr. J. R. Kinnersley, M.I.E.E., has been appointed a management officer of the London Electricity Board in succession to **Mr. S. Eclair-Heath,** and will currently undertake responsibilities in the South Western Districts. Until Mr. Kinnersley's successor as district manager of the Essex Suburban District has been appointed and has taken up his duties Mr. Kinnersley will continue to be responsible for that District.



Mr. E. C. Green, general manager of Thermodare (Great Britain) with Mr. P. H. Greer, director and general manager, Unidare, Ltd., at the latter company's Dublin works (see page 929)

Mr. D. H. Powell, M.S.I.A., F.R.S.A., has been appointed head of the Plastics Design Studio of E. K. Cole, Ltd.

Mr. B. C. Wilkins

Mr. B. C. Wilkins retired from the board of Henley Foundries on 8th April. He had been a director since 1945, when the company was known as Oakley Brothers, Ltd. Mr. Wilkins commenced his career as a clerk in the Accounts Department of W. T. Henley's Telegraph Works Co., Ltd., in 1912. He became chief accountant in 1927, a position he occupied until 1954 when he retired, but he was retained on special duties with the company until 1956.

Mr. J. Bell, B.Sc., F.Inst.P., has been appointed a director of the M.O. Valve Co., Ltd., a subsidiary of the General Electric Co., Ltd. He is deputy director of the G.E.C.'s Wembley Research Laboratories, which he joined in 1929. His scientific work has been largely in the field of radio and radar transmitting valves.

A reorganisation has taken place at Wholesale Electrical Components, Ltd., Gray's Inn Road, W.C.1. The management of the company has been vested in **Mr. L. A. Conner** (a director), enabling **Mr. A. B. L. Richmond** to devote more time to his friends in the trade. **Mr. E. A. Brookes,** who has been with the company for ten years, has been appointed manager, and will be operating from Gray's Inn Road.

The final match of the **Cable Makers' Association Football Cup Competition** took place on 30th April on the A.E.I. (Woolwich) ground at Charlton, between B.I.C.C. Prescot and B.I.C.C. Erith. B.I.C.C. Prescot were the winners by five goals to one. At the conclusion of the match a token presentation was made to the captain of the winning team by Mr. E. J. Vidler, president of the competition. Later, the annual dinner, which was attended by all those teams who had competed throughout the season, was held at Coventry Street Corner House, London. Mr. W. A. H. Brown, chairman of the competition, congratulated both teams and thanked the directors of the supporting companies who made the competition possible. Mr. Vidler referred to the opportunity the competition gave for the management to get together with the people who played and enjoyed this game. Mr. I. Sörensen, member of the Council of the Football Association, replied on behalf of the guests.

Mr. E. J. Vidler, president of the Cable Makers' Association Football Cup Competition, presents the trophy to Mr. W. Watkinson, captain of B.I.C.C. Prescot, winners of the cup for 1960

Mr. C. B. Simpson

Mr. C. B. Simpson, B.Sc.Tech., M.I.E.E., A.M.I.Mech.E., recently took up his duties as deputy engineer of the No. 3 (Sheffield) Sub-Area of the Yorkshire Electricity Board in succession to **Mr. H. Anderson,** M.I.E.E., who is now engineer of the No. 6 (Hull) Sub-Area. Mr. Simpson has been for the past ten years the senior assistant engineer in the system design section at the Board's head office dealing with the development of the 66 kV and 33 kV systems and the supply in-feeds from the 132 kV and 275 kV systems.

The annual staff dinner and dance of **Switchgear & Equipment, Ltd.,** was held on Friday last in Banbury, over 250 members of the staff and guests, who included a large number of representatives of Electricity Boards, attending. The function was entirely informal; there was no official toast list and the occasion was mainly one of felicitations, following the recent retirement of Mr. A. G. H. Oxley from the managing directorship of the company, and the appointment of Mr. D. A. J. Oxley (his son) as his

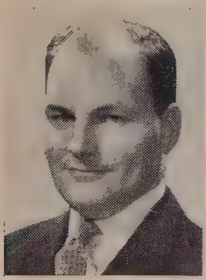
At the annual dinner of Switchgear & Equipment, Ltd. Left to right: Mr. A. G. H. Oxley, Mrs. A. G. H. Oxley and Mr. D. A. J. Oxley

successor. Mr. A. G. H. Oxley paid tribute to the support accorded him during his long association with the company, both by the staff and the officials of the various Electricity Boards, with whom much of the company's business is conducted. Mr. Douglas Oxley spoke of his father's work over the past twenty-eight years, and referred in appreciative terms to the help he personally had received. Tributes to both Mr. A. G. H. Oxley and his son came from Mr. J. W. Bird, who retired as chief engineer of the South Wales Electricity Board in 1957 and is now a part-time member of the company, Mr. F. C. Orchard (manager of the Fens Sub-Area of the Eastern Electricity Board) and Mr. R. H. Asserson (director of Falk, Stadelmann & Co., Ltd., the parent company). Following the dinner, there was dancing until the early hours. On Saturday morning a number of the guests visited the Banbury works to see some of the company's new designs, and afterwards had lunch at the White Lion Hotel.

A collection for a box of chocolates and cigarettes realised £11 in aid of the E.I.B.A.

Mr. George Ellison, Jnr., has been elected to the boards of the associated companies, George Ellison, Ltd., Alfred Ellison, Ltd., and Tufnol, Ltd. He is the grandson of the late Mr. George Ellison, the founder of all three companies.

Mr. T. J. Rowlands, B.Sc., A.M.I.E.E., has been appointed chief engineer and manager of the Engineering Department of George Ellison, Ltd. After service in the last war in the R.A.F. he joined the Merseyside and North Wales Electricity Board as assistant operations engineer and later was with the English Electric Co., Ltd. In 1958 Mr. Rowlands was appointed chief engineer and manager of the Switchgear Division of Lancashire Dynamo Nevelin, Ltd., his responsibilities later including the Rectifier Division of that company.



Mr. G. Ellison

Mr. T. J. Rowlands

Mr. D. G. Nairn, O.B.E., chairman of J. & F. Stone Lighting & Radio, Ltd., announces that in order to reduce his commitments in the City he will not seek re-election as a director of the company at the annual general meeting to be held next November. **Mr. F. S. Bassett** has been appointed a director with a view to his succeeding Mr. Nairn as chairman.

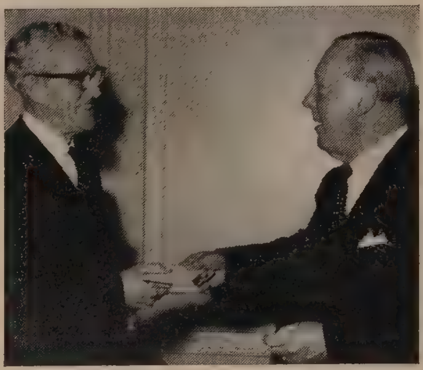
Mr. G. A. Rendle, B.Sc., M.I.E.E., who has been deputy general manager of the British Insulated Callender's Construction Co., Ltd., since August, 1958, has retired. He joined Callender's Cable & Construction Co., Ltd., in 1920 as a contract engineer and until 1925 was engaged on telephone and power cable contracts, principally in London and Scotland. He then took charge of the construction of underground and overhead electricity supply systems in the Weald of Kent, Herne Bay and Dublin. In 1930 he went to Buenos Aires to carry out a cable contract for the Central Argentine Railway. On returning to this country in 1932, he was appointed resident engineer to take charge of the first contract for the Dumfries County Council rural electrification scheme. In 1937 he was appointed resident engineer at Nottingham. Following the formation of British Insulated Callender's Cables, Ltd., he was appointed deputy cable contracts manager in 1946. In 1949 he was appointed cable contracts manager of British Insulated Callender's Construction Co. and in 1954 director and manager, cable contracts, in which capacity he continued to act following his appointment as deputy general manager.

Mr. G. A. Rendle

Mr. M. McManus, a member of the sales staff of the North of Scotland Hydro-Electric Board in Dundee, has been elected Lord Provost.

A tape recorder was presented to **Col. B. H. Leeson,** C.B.E., T.D., M.I.E.E., by Lord Nelson of Stafford on behalf of the Council of the Association of Short-Circuit Testing Authorities (A.S.T.A.) to mark Col. Leeson's retirement as chairman of the Association. The presentation took place at the Connaught Rooms, London, before the annual general meeting of A.S.T.A. of 6th May.

Col. Leeson was associated with the establishment of the first British short-circuit testing station and the national and international standardisation of switchgear. This led to his playing a prominent part in the formation of A.S.T.A., of which he has been a Council member since the Association was incorporated in 1938, and chairman since 1947.



Col. B. H. Leeson (left) receiving a presentation from Lord Nelson of Stafford

Mr. J. R. Wilkinson, B.Sc.Tech., M.I.E.E., F.Amer.I.E.E., who is a member of the Councils of both the British Electrical and Allied Manufacturers' Association and the Association of Short-Circuit Testing Authorities, has been elected chairman of A.S.T.A.

OBITUARY

Mrs. P. J. Robinson.—The death has been announced of Mrs. Martha Lilian Robinson, widow of Mr. P. J. Robinson who was city electrical engineer of Liverpool for many years.

Mr. P. Egan.—The death has occurred of Mr. Patrick Egan, of Tullamore, Eire, who was one of the original members of the Eire Electricity Supply Board. He was eighty-four.

Mr. E. H. E. Giles, managing director of Giles (Electrical Engineers), Ltd., died on 22nd April at the age of fifty-five.

Electrical Development in 1959

ANNUAL REPORT AND LUNCHEON OF THE E.D.A.

THE record growth in the sales of domestic electrical appliances last year was primarily due to the sudden release of purchasing power. The British Electrical Development Association is nevertheless justified in claiming that its national advertising, and the support it received locally from members, " must have been responsible for influencing a considerable share to be devoted to the acquisition of more electrical appliances for the home, despite the increased advertising by competitors." The expanding scope of the Association's publicity activities and, more important, the indications of their effectiveness, are highlighted in the report of the Council for 1959, which was presented at the annual general meeting last Tuesday.

During 1959 E.D.A. national advertising was again concentrated mainly on raising the sales of electric cookers and water heaters, but a small amount of refrigerator advertising was also included. From February to November the Association's advertisements appeared in Sunday newspapers and in women's and " home interest " magazines with a combined circulation of over 45 million, and in the autumn the cooker advertising was extended to national daily newspapers with a combined circulation of 16 million. Sales of publicity material increased by 24 per cent and were a record.

The operation of the cash/order scheme at the Ideal Home Exhibition resulted in sales by the Electricity Boards of appliances to the value of almost £35,000; some 32,000 inquiries were also taken at the stand. Of the 445 inquiries passed to the Electricity Boards from the E.D.A. stand at the Building Exhibition, 285 were concerned with floor warming and 55 with other forms of electric space heating. Over 30,000 people visited the Electrical Section at the Building Centre during the year. Of the thirty prize-winning designs for new houses in a competition run by the *Ideal Home* magazine, twelve specified electric floor warming, and electric water heating appeared in 18 specifications. The interest in electric floor warming is further illustrated by the fact that the initial printing of 50,000 copies of the booklet " Electric Floor Warming " were quickly exhausted and that over 600 coupons were returned from advertisements inserted in two issues of three " home interest " magazines.

In the industrial field the series of advertisements in the form of data sheets was continued in over 100 trade, technical and other journals. The illustrated news sheet *Electrified Production* now has an industrial circulation of 35,000, including recipients in eight foreign countries. A series of advertisements featuring actual case histories appeared in the main farming journals and brought a considerable number of inquiries.

During the year 31 exhibits were designed and organised at national shows, and well over 200 articles, as well as smaller features and photographs, were supplied to the Press. There was increasing interest in British appliances from the women's Press on the Continent and editorials were supplied for publication in France, Holland, Finland and the United States.

Over 15,000 copies of E.D.A. films were issued on loan during the year. Further royalties received from the distribution of E.D.A. educational films in the United States and in France brought the total receipts from these sources up to $5,242 and fr.635,008 respectively. The 172 copies of films purchased brought the total up to 4,007. Nearly 2,000 new photographs were added to the photographic library and more than this number were issued on loan.

As part of its educational work the E.D.A. organised an electrical quiz competition in which over 1,000 Townswomen's Guilds participated. More than 450 requests for information and services were received from schools and 35,000 visitors passed through the E.D.A. exhibit at the Schoolboys' Own Exhibition.

The year was noteworthy for the high level of activity

Sir Josiah Eccles (president), Mr. Richard Wood (Minister of Power), Mr. T. E. Daniel (chairman), Mr. J. C. George (Parliamentary Secretary, Ministry of Power) and Mr. J. I. Bernard (director and secretary) at the annual luncheon

Mr. V. W. Dale and Sir John Hacking; Sir Christopher Hinton, Mr. M. T. Flett, Mr. S. F. Steward and Mr. C. R. King; Lord Morrison of Lambeth and Mr. W. S. Lewis

in all types of testing work; 553 reports and addenda were issued. In addition to routine appliance testing, investigations were carried out for technical committees of the British Standards Institution and for E.D.A. committees. The number of appliances tested for manufacturers increased to 341 as against 293 in 1958.

Much of the remaining work which the E.D.A. undertakes on behalf of the industry, though no less useful than that mentioned above, is less simply measured. Apart from recording the many conferences in both the electrical and other industries in which the Association participated, the report outlines the activities of the E.D.A. committees covering such subjects as cookers, commercial catering, industrial development, rural electrification, electric traction and public lighting, on several of which the manufacturers are represented. The report also includes notes on the work of the Electric Vehicle Association and the Electrical Association for Women.

Annual Luncheon

Sir Josiah Eccles, the president, was in the chair at the annual luncheon at the Savoy Hotel, London, on Tuesday, when the principal guest was the Minister of Power, the Rt. Hon. Richard Wood, M.P. Mr. Wood said that in his visits to the various Area Boards he had found that the respective chairmen had decided views on the question of capital demands. He wondered, therefore, whether his message to the Association should be one of congratulation or rebuke. He decided, however, that it would be illogical to rebuke. He referred to the recent visit to Poland in which he and the president participated, thanking Sir Josiah for his wise advice and for the comprehensive report that he had prepared. He spoke of the astonishing increase in electrical demand over the last ten years. All kinds of consumption had increased and rural electrification had made much progress. The proportion of fuel consumed in electrical form had moved from between a sixth and a seventh of the total in 1949 to a quarter in 1959.

Electrical development, nuclear generation and the expansion of the supergrid had all required extra capital expenditure, said the Minister. This heavy growth in capital investment had placed a great responsibility on the Association. The high capital expense could more easily be borne if the consumer was persuaded of the merits of load building appliances. Speaking of the increased use of washing machines and refrigerators, he said that it was most important to remember that, apart from building a load, it was also important to spread it. He was pleased with the present development of electric floor warming, remarking that this did not entail the burning of midnight oil, but the use of cheap off-peak electricity.

He complimented the Association on their work in connection with the safety and testing of appliances. Mention was also made of the agreement reached by the Association with manufacturers and the British Standards Institution on setting up the National Approvals and Marking Scheme for Domestic Electrical Appliances. With increasing safety and more and more use to which electricity could be put, the question was going to be "are there any limits to electrical development" said the Minister.

In the course of his reply Sir Josiah Eccles said that E.D.A. was not just a public agency but an integral part of the service that the industry was trying to render to its customers. Sir Josiah concluded by paying a special tribute to Mr. Bernard, the director, and his staff. He then proposed the toast of the guests and the Dean of St. Paul's, the Very Rev. W. R. Matthews, made a brief delightful response.

Annual General Meeting

Mr. T. E. Daniel, chairman of the Council, presided at the subsequent annual meeting when, after the formal business, he announced that Sir Edwin Herbert, K.B.E., LL.D. (chairman of the Herbert Committee on the Electricity Supply Industry) had been appointed president of the Association for 1960-61. Lord Morrison of Lambeth had been appointed a vice-president and Capt. J. M. Donaldson, Sir Harry Railing and Mr. V. W. Dale had been re-appointed vice-presidents.

A vote of thanks to Sir Josiah Eccles, the retiring president, was proposed by Mr. D. Bellamy and seconded by Mr. R. P. Watson, and thanks to Mr. Daniel were accorded by Messrs. D. B. Irving and H. V. Pugh. The proceedings ended with the customary vote of thanks to the chairman, vice-chairmen and members of all E.D.A. committees and to the technical Press.

At the first meeting of the newly-constituted Council Mr. D. B. Irving (chairman, London Electricity Board) was elected chairman and Mr. R. R. B. Brown (chairman, Southern Electricity Board) vice-chairman for the ensuing year.

A.E.A. and Electricity Boards

PAYMENT FOR RESEARCH AND DEVELOPMENT

FROM the electrical point of view the most interesting part of the report of the Comptroller and Auditor General (Sir Edmund Compton) in the fifth balance sheet of the United Kingdom Atomic Energy Authority (H.M. Stationery Office, 1s) is that dealing with payments to be made to the Authority by the Central Electricity Generating Board and the South of Scotland Electricity Board.

Sir Edmund Compton refers to the considerable expenditure already incurred, and to be incurred, on research and development relating to the production of electricity from nuclear power, in respect of which it proposed to charge a royalty per kW installed in the nuclear power stations. In March, 1956, the Authority told the Treasury that its expenditure on this account had already amounted to £15 million and by March, 1966, was expected to have totalled £110-130 million. It was then thought that by mid-1965 royalties would amount to about £20 million and that thereafter royalties would match development costs of about £10 million a year.

Basis of Payments

The Electricity Boards apparently accepted the payment of royalties in principle but their view appeared to be that they should, in practice, pay royalties only when the cost of generation by nuclear power compared favourably with that of conventionally-produced electricity. An understanding was reached by which Boards should pay, for twenty years, a royalty per kWh sent out by nuclear stations completed between 1963 and 1965 at a rate estimated to be equivalent to the proposed royalty per kW installed. But this understanding involves the waiver of royalties on the first four stations (those due to be commissioned before 1963), and towards the end of 1965 a review of royalties payable in respect of stations completed after that date. In 1959 the Authority made licence agreements with the contractors, with retrospective effect to 1st October, 1956, under which the contractors would pay the Authority a royalty per kW installed for each gas-cooled, graphite-moderated reactor supplied, except the first four. The rate was to be subject to review at any date after 1st October, 1961. Payments under these agreements would be alternative to direct payments by the Boards and the agreements provide that the licensees shall not be obliged to pay royalties at a higher rate than that which may be separately agreed with the Boards.

The Authority's accounts do not show what part of its research and development expenditure is incurred in support of the nuclear power programme. In reply to his inquiries Sir Edmund Compton was told by the Authority that it was Government policy that electricity consumers should contribute to past and future development expenditure. The Authority recognised, however, that it must have regard to what the market would bear. In 1956 the Authority considered that if the suggested kW-installed charge were made it could expect to recover some £50 million in 15 years from 1956. The decisions to defer recovery of expenditure and to forgo earnings on some 1,400 MW of installed capacity, combined with the slowing down of the nuclear power programme, would reduce the Authority's earnings significantly, but these decisions had been approved by Ministers and were beyond the discretion of the Authority. Trawsfynydd would be the first station on which royalties would become payable.

In 1955 the Authority undertook to supply canned fuel elements for nuclear power stations and process used elements. But up to December last no contracts had been entered into although delivery of fuel elements to the first two stations were expected to commence this year. The Authority told Sir Edmund Compton that as the nuclear power programme was regarded as a joint pioneering effort it was not desirable to adopt rigid contractual positions too early; the heads of agreement provided in principle for the recovery of expenditure incurred. In the meantime advance payments had been made in 1959-60 by the C.E.G.B. at the expected price for fuel elements for the first two stations.

The Authority undertook to secure the satisfactory supply of graphite for the nuclear stations and entered into non-competitive contracts with two manufacturers. Under these the contractors will recover the capital costs involved by direct contribution from the Authority or in the price of the products. Contracts have been entered into for the resale of the graphite to the contractors constructing the first four nuclear stations at fixed prices on a policy of "no profit no loss," with a margin to cover the risk of rises in costs. The Authority appeared to have ordered at high prices substantial quantities in excess of firm requirements and might be faced with a fall in market prices after 1965. The Authority told Sir Edmund Compton that it had no specific indemnities from the Electricity Boards other than those implied in the heads of agreement of 1955; the whole question was under negotiation with the C.E.G.B.

Members' Writs Against E.T.U.

ON Monday Mr. Frank Chapple, a non-Communist member of the Executive Council of the Electrical Trades Union, and Mr. J. T. Byrne, Clydeside area secretary, announced that they had decided to institute legal proceedings "in an attempt to redress the very serious grievances of the members of the Union."

The terms of the writs were disclosed on Tuesday by a firm of London solicitors. They seek a declaration that the election of Mr. Frank Haxell as general secretary was contrary to the rules of the Union and that Mr. Byrne was elected as general secretary. Alternatively, they seek a declaration that a fresh election should be held subject to certain safeguards. Mr. Byrne also claims damages for alleged conspiracy by breach of the rules of the Union and for alleged breach of contract.

Financial Section

STOCKS and SHARES

CONTINUED weakness in industrial share prices, in conjunction with an appreciable rise in gilt-edged stocks, has considerably narrowed the gap between the level of yields in the two markets. Whereas the difference was almost as wide as 1½ per cent at the beginning of April, now the average return of about 4½ per cent from leading industrials is only about ¾ per cent less than the yield on Consols, with which it is usually compared. Having lost some of their optimism about the scope for further capital appreciation in equities for the time being, people are evidently showing more interest in the income from their investments.

Extent of the Fall

According to the share price indices, leading industrials had lost, by the beginning of this week, some 13 per cent of their value as compared with the peak of the market four months earlier. In the electrical section, this average experience has been recorded approximately in such shares as Thorn Electrical, Hoover, Pye, B.I.C.C., Ward & Goldstone, Brook Motors, Automatic Telephone, Lucas and Elliott-Automation. Depreciation has been heavier in some of the leading electrical and engineering shares. Falls of 14s each in the shares of A.E.I. and English Electric have reduced their value by the equivalent of 21 and 26 per cent respectively, while the 12s 6d drop in Babcock & Wilcox equals 25 per cent. Above average also are the falls of around 10s in Plessey and E. K. Cole, of 9s in G.E.C., 13s in E.M.I., 12s in C. A. Parsons and 6s in Bulpitts. On the less depressing side, shares which have maintained their value better than most include Morphy-Richards, Newman Industries, Chloride Electrical, Rheostatic, Contactor Switchgear, Dictograph and Hackbridge & Hewittic.

Dividends Declared

As forecast at the time of last year's capital reorganisation, Automatic Telephone and Electric are paying a final dividend of 12 per cent on ordinary capital of £3·8 million. The total of 17 per cent for the year is effectively the same as was paid previously on the ordinary and deferred stocks and there is very little change either in the level of profits, the net surplus for 1959 being again just above the million mark, after tax. The 10s shares remained around 18s 9d, yielding 4½ per cent. Bowthorpe Holdings 2s shares were quoted 1s lower at 8s 9d after the declaration of a final dividend of 12½ per cent on capital increased by a scrip issue. This makes a total equivalent to 18½ per cent for the year, or rather more than 2 per cent above the previous payment.

Ultra Electric

Evidence of much increased activity in the fields of radio, television and

Price Changes in

Company or Board	Nom. Value	Middle price 9th May	Week's Rise or Fall	Dividend Pre-vious	Dividend Last	Yield %	1960 High-est	1960 Low-est
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	76	+½	3	3	3 19 0	79½	75½
Brit. Elec. 1974/77	100	73	+½	3	3	4 2 3	76	72½
Brit. Elec. 1976/79	100	75½		3½	3½	4 12 9	79½	75½
Brit. Elec. 1974/79	100	86	+½	4½	4½	4 18 9	90½	85½
Overseas Electric Supply								
Calcutta Elec.	£1	20/6		6·8†	7†	11 3 0	20/9	19/3
East African Power	£1	16/–		7½	8	10 0 0	20/3	16/–
Nigerian Elec.	£1	15/6		8	8	10 6 6	19/9	15/6
Perak Hydro-Elec.	£1	17/–	+6d	10	5	5 17 9	17/9	15/3
Electrical Shares								
Aberdare Holdings	5/–	15/3	–3d	17½	17½	5 14 9	19/–	15/3
Aerialite	1/–	7/6	–3d	54	54	7 4 3	9/6	7/6
Allen, W. H.	£1	53/9		11	12	4 9 3	60/–	53/9
Allied Insulators	5/–	20/–		—	20	5 0 0	23/3	20/–
Anglo-Portuguese Tel.	£1	28/3	+9d	9	9	6 7 6	28/6	26/–
Aron Elec. Ord.	£1	62/–		15	15	4 16 9	62/–	47/–
Assoc. Elec. Ord.	£1	52/6	–2/6	15	15	5 14 3	66/6	50/6
Automatic Tel. & El.	5/–	18/9	–3d	17	17	4 10 9	21/9	17/3
Babcock & Wilcox	£1	36/3	–9d	13	9	4 19 3	48/9	33/6
Bakelite	10/–	46/3	–9d	15	17½	3 15 9	48/9	40/–
Baldwin, H. J.	2/–	2/–x.r.		20	—	—	2/6	2/3
Berry's Electric	5/–	33/9	–1/3	10	20‡*	2 19 3	38/–	29/6
Bowthorpe Holdings	2/–	8/9	–1/–	27	18½*	4 4 6	11/6	8/9
British Elec. Traction:								
Def. Ord. "A"	5/–	42/–	–3/–	25	35	4 3 3	49/3	42/–
B.I. Callender's	£1	54/–	–1/–	13½	13½	5 0 0	61/–	50/–
B.I. Callender's 6% Pref. ...	£1	20/–		6	6	6 0 0	21/–	19/9
British Thermostat	5/–	21/3		30	35	4 2 3*	26/–	21/3
Brook Motors	10/–	46/3	–6d	25	25*	4 12 6*	53/6	46/3
Bulgin, A. F.	1/–	10/–		50	55	3 13 3*	10/3	8/–
Bulpitts	5/–	17/–	–9d	15	16¼	4 15 6	23/3	17/–
Burco Dean	5/–	12/6	–6d	16	18	7 4 0	15/9	12/6
Cable & Wireless:								
Ord.	5/–	15/–	–3d	10	10*‡	3 6 9	18/3	14/3
4% Loan	100	96		4	4	4 3 3	96	94½
Chloride El. Storage "A" ...	£1	70/–	–1/3	20	17½*	5 0 0	74/–	65/6
Clarke Chapman	£1	48/9	–2/9	13¾	13¾	5 12 9	63/6	48/9
Cole, E. K.	5/–	22/–	–1/3	17½	20	4 11 0	31/9	22/–
Contactor Switchgear	5/–	16/6		14	14	4 4 9	17/9	15/9
Cossor, A. C.	5/–	7/3	–3d	Nil	5	3 9 0	10/–	7/3
Crabtree	10/–	24/–		20	22½‡	4 13 9*	28/3	24/–
Crompton Parkinson	5/–	11/9	–6d	12	14	4 15 0*	15/–	11/9
Davis & Timmins	5/–	28/3	+9d	20	25	4 8 6	28/9	21/–
De La Rue	10/–	62/–		17½	20	3 4 6	73/6	62/–
Decca "A"	10/–	42/6	–3/-	50	20*	4 14 3	51/3	42/6
Desoutter	5/–	42/–		21⅜	30	3 11 6	42/–	37/6
Dewhurst	2/–	7/9		20	20	5 0 0	8/6	7/6
Dictograph Tel.	2/–	13/–		20	20	3 1 6	13/3	12/–
Dimplex	5/–	30/–	–1/3	—	25‡	4 3 3	32/6	26/9
Dubilier Condenser	1/–	5/9	–3d	20	25	4 7 0	6/–	5/–
Duport	5/–	22/–	–6d	12½	17½	3 19 6	30/3	22/–
E.M.I.	10/–	45/–	–2/6	20	14*‡	3 2 3	58/9	45/–
Electrical Apparatus	5/–	14/3	–9d	14½	14½	5 1 6	15/–	12/9
Electrical Components	5/–	10/–	–3d	12½	15	5 0 0*	13/9	10/–
Elec. Construction	£1	37/6		8½	9	4 16 0	43/–	35/3
Elliott-Automation	5/–	21/6	–6d	—	9·3*	2 3 9	25/–	19/9
Enfield Rolling Mills	£1	48/–	–1/–	15	15	6 5 0	56/3	48/–
English Electric	£1	38/9	–1/3	14	10*	5 3 3	53/–	38/9
English Electric 3¾% Pref. ...	£1	12/6		3¾	3¾	6 0 0	13/–	12/6
Ericsson Tel.	5/–	22/6		13†	13†	4 14 3	28/6	22/6
Ever Ready	5/–	23/–	–9d	20	27‡	3 11 9*	27/3	23/–
Falk Stadelmann	£1	32/–		10	10	6 5 0	35/9	32/–

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

other electrical equipment is to be seen in decisions by Ultra and Murphy Radio to raise fresh capital. New 5s shares offered to shareholders of the former company are available in the market at a premium of about 1s on the issue price of 19s. Nearly a million is being raised by the company in this way. Profits in the year ended last March are estimated to have expanded by about a half; the dividend is expected to be brought up to a total of 25 per cent and the directors hope to be able to recommend the same rate next year on capital enlarged by the present issue. This indicates a yield of 6¼ per cent on the new shares at an all-in price of 20s. They will be transferable free of stamp duty for some weeks to come.

Murphy Radio

Murphy Radio's coming issues will also apparently produce the best part of a million, half of it in the form of a rights issue of new ordinary shares and the remainder in preference shares. Increasing activity and diversification of the group's interests are given as the reason for adding to the financial resources at this stage. In what is described in the annual report as an ebullient market, the group's net profit improved last year by 70 per cent and the dividend is being raised from 20 to 22½ per cent.

Brook Motors Interim

Brook Motors are maintaining the interim dividend, on account of the twelve months ending next September, at last year's rate of 5 per cent, but on capital subsequently increased by a one-for-six scrip issue. For 1958–59 there was a total of 25 per cent, and this was covered more than twice over despite the 25 per cent contraction of profits in that period. In the interim progress statement for 1959–60 now issued, the company announces a material improvement in the first six months, as compared with the same half of 1958–59, estimated group earnings being £48,000 higher at £366,000 (before tax and depreciation). Quoted at 46s 3d, the company's 10s shares show a yield of 4·6 per cent, if the dividend rate is scaled down in proportion to the capital increase, or nearly 5½ per cent if it is repeated at the full rate.

A. H. Hunt Issue

All sections of the A. H. Hunt (Capacitors) business were said by the chairman last month to be under considerable pressure, so that new factory space had become essential. On this and other projects, expenditure of half a million is contemplated over the coming three years. About half that sum is being raised now by the issue of 343,200 new 4s shares. These have been changing hands in the market at about 8s above the price of 15s at which they are offered to present shareholders, and are transferable free of stamp duty for the time being. Trading profits expanded last year by almost 40 per cent and the dividend was raised from 15 to 20 per cent. Maintenance of this rate on the increased capital is expected by the board, and would produce a yield of 3½ per cent on the shares.

Electrical Investments

Company or Board	Nom. Value	Middle price 9th May	Week's Rise or Fall	Dividend		Yield %	1960	
				Pre-vious	Last		High-est	Low-est
Electrical Shares—continued						£ s d		
G.E.C.	£1	38/3	−6d	10	10	5 4 6	47/6	37/–
G.E.C. 6½% Pref.	£1	21/–		6½	6½	6 3 9	22/3	21/6
General Cables	5/–	6/–		15	Nil	—	10/–	6/–
Goblin (B.V.C.)	5/–	10/–	−3d	7½	12½	6 5 0	13/9	10/–
Greenwood & Batley	£1	125/–		20	20	3 4 0	125/–	120/–
Hackbridge Holdings	5/–	15/–	−6d	20	20	6 13 3	17/3	15/–
Hackbridge & Hewittic	5/–	14/3		20	20	5 5 3*	15/–	13/–
Head Wrightson	5/–	22/9	−9d	20	14‡*	3 1 6	31/6	22/6
Heatrae	2/–	11/6		20	20	3 9 6	11/9	8/9
Holophane	5/–	18/6	−6d	22½	26	7 0 6	20/6	17/6
Hoover	5/–	47/–	−2/3	60	90	4 15 9*	55/–	45/–
I.C.I.	£1	55/6	−2/6	8	11¼	4 1 0	62/9	55/6
Intl. Combustion	5/–	27/6	−1/–	30	30	5 9 0	46/9	26/6
Intl. Computers & T.	£1	61/6	−1/6	—	10	3 5 0	78/6	61/6
Johnson & Phillips	£1	20/6		5	5	4 17 6	24/–	20/6
Laurence Scott	5/–	18/6	−3d	15	15*	4 1 0	25/3	18/–
Lister, R. A.	£1	55/–	−3/9	12½	14	5 1 9	62/–	53/9
Lucas, J.	£1	65/9	−5/6	10	12½	3 16 0	74/6	65/9
Marconi Marine	£1	46/3		10	10	4 6 6	46/3	42/6
Marryat & Scott	2/–	15/–	−3d	37½	22½*	2 19 0	16/9	14/3
Mather & Platt	£1	50/–	−2/6	10⅔	11	4 8 0	59/–	50/–
Metal Industries	£1	65/6	−2/–	14	15‡	4 11 6	76/3	63/6
Midland Elec. Mfg.	£1	57/6		10	12	4 3 3	57/6	53/6
Morphy-Richards	4/–	20/3	−3d	20	25	2 9 6*	21/6	16/3
Murex	£1	64/6	−3/-	17½	15	4 13 0	77/-	62/6
Newman Ind.	2/–	5/3x.d.		10	12½	4 15 3	5/3	4/–
Oldham & Son	1/–	2/9		17½	17½	6 7 3	3/–	2/9
Parsons, C. A.	£1	46/9	−9d	8⅙	9⅜	4 1 0	59/–	46/–
Philips' Lamps	Fl.10	177/6		13·3	16	1 16 0	180/–	137/–
Plessey	10/-	44/3	−1/9	20	14*‡	3 3 3	54/6	44/3
Pye	5/–	16/–	−9d	12½	12½*‡	3 18 3	19/–	16/–
Pyrotenax	5/–	53/9	−1/3	—	34	3 3 3	55/–	44/3
Radiation	£1	37/6	−3/–	6	12	6 8 0	44/6	34/6
Reliance Clifton	5/–	22/–		15	15	3 8 3	28/–	22/–
Reyrolle	£1	77/6	−1/–	17½	17½	4 10 3	104/6	77/6
Rheostatic	4/–	21/6	−6d	20	25‡	4 13 0	22/–	16/6
Richardsons Westgarth	10/–	10/9	−3d	8⅓	8⅓	7 15 0	14/9	10/9
Simon-Carves	5/-	46/9x.d.	−1/6	25	35	3 14 9	54/-	36/–
Smith (England), S.	4/–	16/3	+3d	12½	17½	4 6 3	20/–	16/–
Southern Areas	£1	14/6		Nil	Nil	Nil	15/3	13/–
Strand Elec.	5/–	16/–		15	20	6 5 0	20/3	16/–
Sturtevant	5/–	15/–	−1/3	15†	15†	8 3 3	24/3	15/–
Sun Elec.	5/–	15/3		25	15*	4 18 3	16/3	15/–
Switchgear & Cowans	5/–	16/–	−6d	15	17½	5 9 6	18/9	16/–
T.C.C.	10/–	72/6		25	35	4 16 6	72/6	55/9
Telephone Mfg.	5/–	6/3	+3d	10	10	8 0 0	7/3	5/–
Telephone Rentals	5/–	18/9	+3d	12½	15*	4 0 0	19/9	17/–
Thompson (John)	5/–	18/–	−9d	25	25	6 19 0	25/9	17/3
Thorn Elec.	5/–	47/–	+9d	17½	20	2 2 6	55/6	44/3
Thorneycroft	£1	23/9		7½	6	5 1 0	31/–	23/3
Tube Investments...	£1	74/–	−3/6	20	13‡	3 10 3	95/6	65/3
Vactric	5/–	32/–	−3/–	25	37½	5 17 3	43/9	32/–
Walsall Conduits	4/–	14/–	−9d	22½	22½	3 13 3*	16/–	14/–
Ward & Goldstone	5/–	51/3	−1/3	25	30	2 18 6	59/3	51/3
Watford	2/–	12/–	−3d	25	25	4 3 3	17/6	11/–
Westinghouse	£1	49/–	−1/–	10	11	4 9 9	59/9	49/–
West, Allen	5/–	12/6	−1/–	12½	12½*	5 0 0	17/–	14/–
Wolf Electric	5/–	11/6		10	12½	5 8 9	13/3	10/9

REPORTS and DIVIDENDS

Babcock & Wilcox, Ltd.—The fall in the output from the main works at Renfrew and at Dalmuir, due to unforeseeable difficulties of a technical nature, and also labour troubles, are given by Mr. W. L. Fraser (chairman) as the main causes of the decline in profits for 1959, but he states in his review of the period that by the middle of the year many of these problems had been overcome, and later a substantially accelerated rate of production did much to make up for the reduced output of the earlier part of the year, but at a considerably higher cost than originally anticipated. The order book was greater at the end of the year than at the beginning, for during 1959 they obtained an improved volume of new business. The most notable was that for the Thorpe Marsh power station of the C.E.G.B. where they will be supplying a single boiler unit having a capacity of 550 MW.

In the export field valuable orders were obtained in Sweden, Finland, Poland and Roumania, in addition to those awarded to subsidiary companies with their own partial manufacturing facilities such as in Australia, Africa and Mexico. The total volume of export orders lagged behind their hopes, however, due to intense world competition.

They are now heavily engaged in their works and at site on the contract for Hinkley Point nuclear power station, where they have built the largest Goliath crane in the world. Other nuclear contract work at present in hand includes the containment vessel for the advanced gas-cooled reactor for the U.K.A.E.A. at Windscale and the reactor vessels and another Goliath crane for Atomic Power Constructions, Ltd., at Trawsfynydd. They have developed nuclear propulsion plant capable of immediate application in naval and merchant vessels.

In order to utilise to the full the facilities at Dalmuir, they have made some interesting and varied arrangements which should improve their overall profitability as sales develop.

After brief references to the group's overseas interests and home subsidiaries, Mr. Fraser deals with the general prospects. He says that there is excessive capacity in the boiler industry. There have also been heavy additions to labour charges and interruptions in the rhythm of production from strikes, but the major burden has resulted from the vast problems relating to the rapid emergence of atomic energy for power purposes. There is no doubt that in the long run the application of nuclear power is inevitable, although there will be delay in achieving a competitive basis as construction costs of conventionally fired generating plant have been lowered markedly in recent years. Expenditure on new plant and by way of investment in the construction of new factories in certain territories overseas has been heavy. The results from some of this outlay, especially in the latter category, will take time to materialise, but some of the subsidiaries are already producing substantial profits which go some way to compensate for losses on domestic orders. Mr. Fraser stresses that in the heavy engineering business it is essential that conditions should be such that reasonable profits are available to enable continuous research and technical development to be undertaken. He refers to his forthcoming resignation from the board of the company after the annual general meeting on 26th May, and the appointment of Sir Kenneth Hague, at present deputy chairman, to succeed him as chairman. The board intends to nominate Mr. Fraser as the first president of the company—at his request on an honorary basis.

Harland Engineering Co., Ltd.—The group profit for 1959, before taxation, amounted to £323,635, as compared with £229,522 for the previous year. Taxation absorbs £152,414, and the net profit is £171,221 (against £100,264). General reserve receives £100,000 and it is proposed to pay a final dividend of 12 per cent, making 16 per cent for the year (against 14 per cent). The balance carried forward is £76,564 (against £72,931 brought in).

Blaw Knox, Ltd.—The annual meeting will be held on 18th May. In his statement, which has been circulated with the report and accounts for 1959, the Hon. Alexander Hood (chairman) says that the Transmission Tower Division reverted to more normal trading conditions after the exceptional year of 1958. While the volume of business transacted and the profits were lower, they were nevertheless satisfactory. The Division is heavily engaged on work for the C.E.G.B., one of the more spectacular being the design and supply of the 630ft high towers for the supergrid Thames crossing between Tilbury and West Thurrock. The Division is also the principal supplier to the South of Scotland Electricity Board, and to a lesser extent to the North of Scotland Hydro-Electric Board and the Northern Ireland Electricity Board. Every effort is being made to maintain their position in the export market, and they have just concluded contracts in New Zealand, South Africa and Sudan, as well as in Canada, which has proved to be a difficult market. A good volume of business is anticipated for the Division over the next three or four years at least, and their position can only improve on the export side. The tendency in the export field is to concentrate more and more on local manufacture, and the company have already made progress in this direction.

Bulpitts (Swan Brand), Ltd.—The annual meeting will be held on 17th May. In his circulated statement, Commander the Hon. J. M. FitzRoy Newdegate (chairman) says that the output in 1959 was substantially higher, but so were production costs. Nevertheless the trading profit of £685,289 virtually maintained the record set up in 1958. Factors that have had a substantial bearing on this result include the rapid rise in costs of copper and also the expenditure on a new product, the "Swanmaid" automatic dishwasher, production of which commenced a year ago. Production of this machine reached an economic stage at the end of 1959. Last year export trade showed a modest increase. Recently there have been relaxations in import restrictions, particularly in Australia, and it is hoped that 1960 will produce a substantial improvement in overseas business. The Government had debarred them from building extensions to their existing factories in Birmingham, and they are now acquiring other premises in the neighbourhood.

In the first months of 1960 the demand for their products remained at a very high level and their sales have shown a satisfactory increase. Costs, however, are still rising, particularly due to the introduction of the 42-hour basic working week. This factor has compelled them to increase the selling price of many of their products.

Pressed Steel Co., Ltd.—The trading profit for 1959 amounted to £6,807,021, as compared with £5,939,127 for 1958, and after meeting all charges, including £2,367,579 for taxation, the net balance is £2,461,506 (against £2,017,598). General reserve receives £1,500,000 and it is proposed to pay a final ordinary dividend of 21 per cent, making 30 per cent for the year (against 25 per cent). The balance carried forward is £2,189,728 (against £2,073,348 brought in).

In his statement, which accompanies

[*Continued on page* 939

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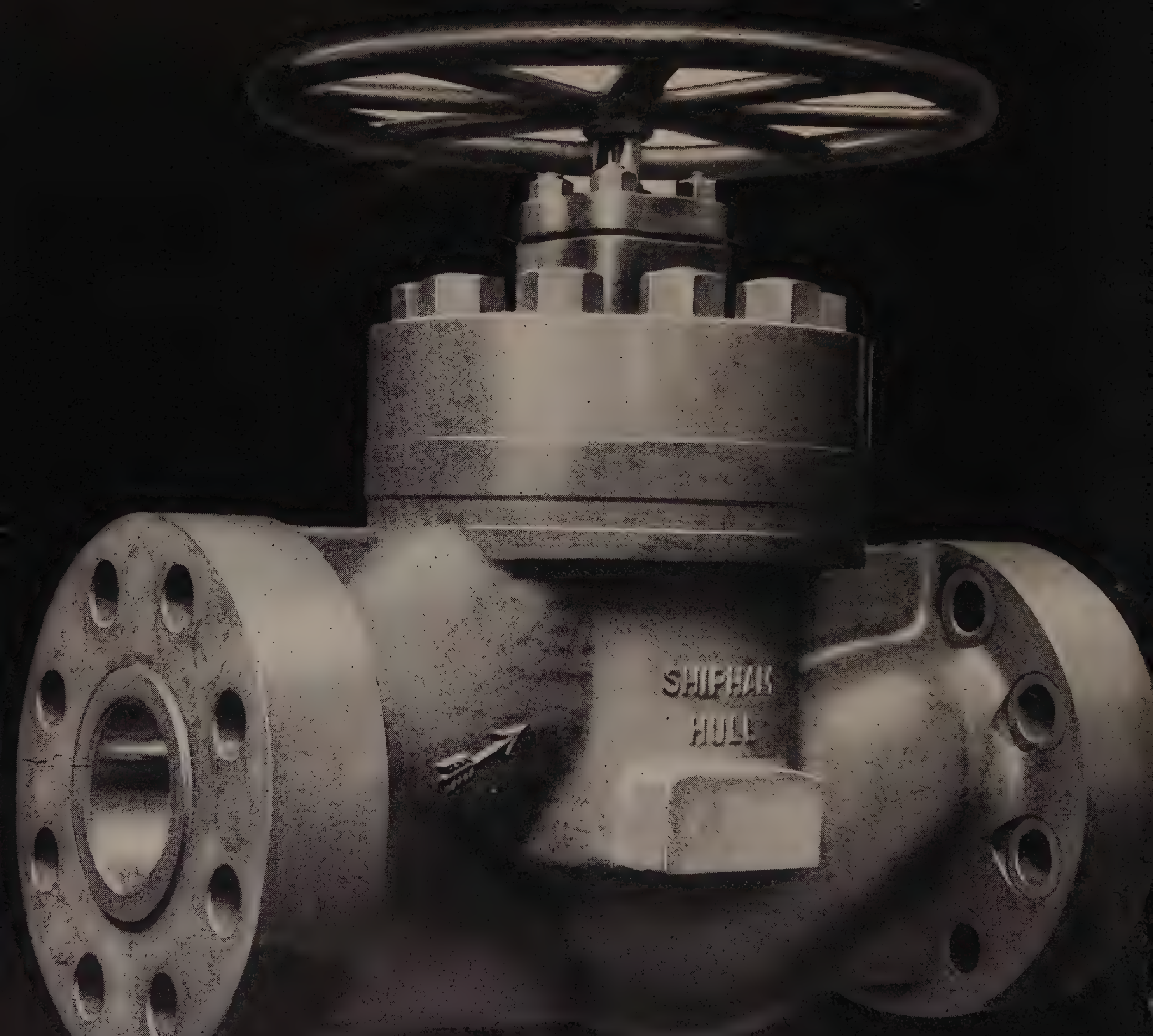

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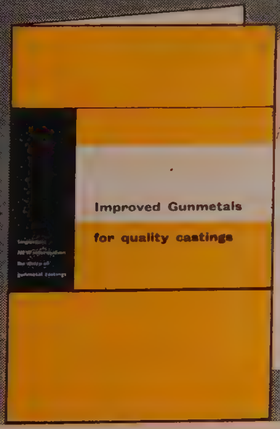

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PAT. APP. No. 5255/59

This newly developed self-conforming grommet, because it is immediately self-locking against the elements, is the solution to many of an engineer's sealing problems.
Any one size will not only accommodate itself to a variety of mounting plate thicknesses, but (designed for cable or control rod) will take these in a variety of sizes and be weather-, water- and dust-proof at a variety of angles to the cable or rod.

Because of its capacity to conform to many varying requirements, it enables a workshop stock range of grommets to be reduced to perhaps one tenth of that at present maintained.

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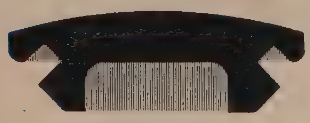

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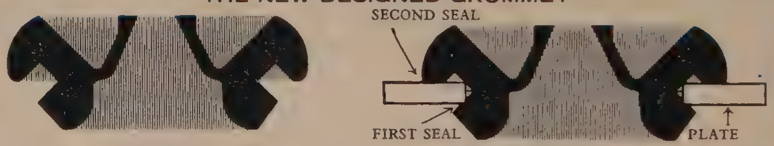
THE NEW DESIGNED GROMMET



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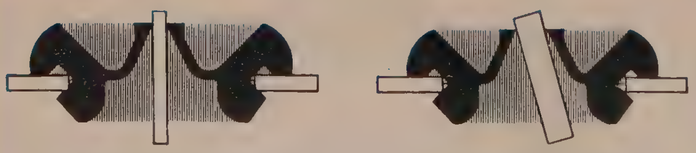

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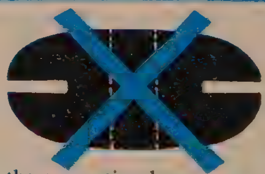

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R.B.101

FINANCIAL SECTION (*Continued*)

the report and accounts, Mr. A. A. Smith (chairman) says that the sales of the Prestcold Division, both of domestic refrigerators and of commercial equipment, reached a record; the problem was to meet the soaring demand. They are anticipating another record year, but it would be unrealistic to expect an increase in sales of the magnitude experienced in 1959. They are planning a steady build-up in production at the new Swansea factory where the first Prestcold came off the line in March. By this time next year this plant will be turning out all their Prestcold products, and, in due course, the other household appliances on which they are working. The market, particularly for domestic refrigerators, is highly competitive, but less than 18 per cent of the estimated 16 million electrically wired houses in this country are equipped with refrigerators, which gives an indication of the sales potential. They continue to do a substantial export business.

Wolf Electric Tools (Holdings), Ltd.—The annual meeting was held on 5th May, Mr. G. M. Wolfe (chairman and managing director) presiding. In his statement, which had been previously circulated, the chairman said that their main subsidiary made a moderate beginning to 1959, but a strong finish raised its income to a level only previously achieved in 1956. The current year had opened promisingly and they were hoping to maintain a high level of sales during 1960.

Automatic Telephone & Electric Co., Ltd.—The trading profit for 1959 amounted to £1,543,198, as compared with £1,554,139 for the preceding year. Taxation absorbs £501,561 and the net balance is £1,075,186 (against £1,028,508), of which £886,685 is attributable to the parent company. It is proposed to pay a final dividend of 12 per cent, as forecast, on the reorganised ordinary capital, making 17 per cent for the year.

G. & J. Weir Holdings, Ltd.—The annual meeting will be held on 1st June. In his circulated statement, Viscount Weir (chairman) says that the Government relaxation on credit restrictions was less favourable in the field of capital goods than in the consumer goods section of industry. New demand for capital goods remained at a low level, both at home and abroad, although there were signs of improvement towards the end of the year. The companies in the group, however, experienced a favourable year's trading which can be considered satisfactory both in respect of output and earnings.

New developments during the year included the acquisition of Lobnitz & Co., Ltd., whose business had since the end of the year been integrated with that of Wm. Simons & Co., Ltd., under the name of Simons-Lobnitz, Ltd. G. & J. Weir, Ltd., concluded an agreement to manufacture under licence the complete range of reciprocating and centrifugal compressors designed by Clark Brothers of Orlean, N.Y., U.S.A. A third new development was an agreement with the Chicago Bridge & Iron Co. to form a joint company known as Weir-Chicago Bridge, Inc., for the manufacture and sale of Weir distillation plants in the United States.

Dealing with orders received, the chairman refers to one from C. A. Parsons & Co., Ltd., for one of the largest boiler feed pumps ever made, for the new Thorpe Marsh power station of the C.E.G.B. The contract also includes three Weir motor-driven booster pumps and two stand-by pumps, which have a capacity of 2,150,000 lb of feed water per hour and are driven by 7,900 b.h.p. motors.

With regard to the prospects for 1960, based on current estimates, there could be a material reduction in gross earnings in the current year, but he does not expect the level of distribution to be significantly affected, and it may well be possible to maintain the present 18 per cent level.

Worthington-Simpson, Ltd., report that after providing £410,000 for taxation, the net profit for 1959 is £476,051, as compared with £543,759 for 1958. General reserve receives £250,000, and it is proposed to pay a final dividend of 12½ per cent, making 20 per cent for the year (against 17½ per cent). The balance carried forward is £193,502 (against £200,401 brought in).

Bowthorpe Holdings, Ltd., report a net profit for 1959 of £375,923, as compared with £379,256 for 1958. Taxation absorbed £311,632. The final dividend is 12½ per cent on capital increased by a two-for-three scrip issue, and follows an interim dividend of 10 per cent before the issue. The total distribution for the previous year was 25 per cent, plus a special interim dividend of 2 per cent.

The Heenan Group, Ltd., is to make a one-for-two scrip issue by capitalising £537,583 10s from reserves in a distribution of 2,150,334 5s ordinary shares. The directors expect to recommend a final dividend of 8 per cent on the increased capital for the year to 3rd September next.

G. N. Haden & Sons, Ltd., report group trading profits for 1959 of £615,638, as compared with £536,862 for the preceding year. Taxation requires £304,290, and the proposed dividend for the year is 20 per cent on capital increased by a three-for-four scrip issue (against 25 per cent on the smaller capital).

The Anglo-Portuguese Telephone Co., Ltd., reports a gross revenue for 1959 of £3,424,585, as compared with £3,098,118 for 1958, and a net profit of £549,930 (against £599,240). General reserve receives £170,000 and it is proposed to pay a final ordinary dividend of 6 per cent, making 9 per cent for the year (unchanged). For the previous year an interim dividend of 3 per cent was paid before a rights issue of £1,000,000. The dividend for the year on the "A" ordinary capital is also maintained at 9 per cent. The balance carried forward is increased by £17,391 to £279,253.

Power Investment Corporation, Ltd.—After providing £36,764 for taxation, the net profit for the year ended 31st March last is £57,186, as compared with £51,537 for the previous year. It is proposed to pay a final dividend of 7 per cent, making 11 per cent for the year (against 10 per cent).

Senior Economisers, Ltd., report a group net profit for 1959 of £153,806, as compared with £163,892 for 1958. Taxation absorbed £167,847. General reserve receives £100,000, and it is proposed to pay a final dividend of 9 per cent, making 17 per cent on capital trebled by a scrip issue (against an equivalent of 16⅔ per cent). The balance carried forward is £60,792 (against £65,100 brought in).

The Rheostatic Co., Ltd., proposes to make a one-for-three scrip issue. The directors anticipate being able to pay in respect of the year ending 30th September next, a total dividend of not less than 18¾ per cent on the increased capital.

T. Clarke & Co., Ltd.—After providing £38,565 for taxation, the net profit for 1959 is £46,767, as compared with £45,133 for 1958. It is proposed to pay a final dividend of 8 per cent, making 16 per cent for the year on capital increased by a one-for-three scrip issue (against an equivalent of 12 per cent). It is also proposed to increase the capital to £500,000 and to amend the borrowing powers to twice the amount of paid-up capital.

Pulsometer Engineering, Ltd.—Group profits for 1959 amounted to £291,044 as compared with £506,429 for the previous year, and after meeting all charges, including £99,096 for taxation, the net profit is £85,758 (against £167,543), to which is added

£55,717 unrequired tax. It is proposed to pay a final dividend of 10 per cent (against 12½ per cent), making 17½ per cent (20 per cent) for the year.

Radio Rentals, Ltd., is paying an interim dividend of 5 per cent on capital increased by a one-for-six rights issue and a one-for-two scrip issue. The interim dividend for the previous year on smaller capital was 7½ per cent.

The Ever Ready Trust Co., Ltd., reports a net revenue for the year to 31st March last of £76,112, as compared with £57,832 for the preceding year. It is proposed to pay a final dividend of 11 per cent, making 18 per cent for the year (against 16 per cent) on capital increased by a rights issue.

Eveready South Africa, Ltd., has announced an interim dividend of 8⅓ per cent (against 5 per cent). It is stated that the increase is to reduce the disparity between the interim and final payments.

Brook Motors, Ltd., have declared an interim dividend of 5 per cent (against an equivalent of $4\frac{2}{7}$ per cent after allowing for a scrip issue).

The Electrical Apparatus Co., Ltd., has announced an interim dividend of 6 per cent (against 4½ per cent).

S. Smith & Sons (England), Ltd., have declared an interim dividend of 4½ per cent (unchanged).

R. A. Lister & Co., Ltd., have declared an interim dividend of 5 per cent (unchanged).

Cable & Wireless (Holding), Ltd., has announced a first interim dividend of 1½d per share (unchanged).

Holophane, Ltd., is paying an interim dividend of 6 per cent (unchanged).

Aerialite, Ltd., is paying an interim dividend of 20 per cent (unchanged).

New Companies

Engelhard Hanovia, Ltd.—Registered 31st March. Capital £100,000. Manufacturers, importers and exporters of and dealers in ultra-violet ray lamps for medical, scientific and industrial applications, therapeutic infra-red lamps, heating appliances, etc. Regd. office: 52, High Holborn, W.C.1.

E.H.V., Ltd.—Registered 2nd March. Capital £1,000. Electrical engineers and general electrical installation contractors, etc. Directors: E. V. Howden and J. A. Erwood. Regd. office: 27, Northolt Avenue, South Ruislip, Middlesex.

B. Beddoes, Ltd.—Registered 29th February. Capital £1,000. Manufacturers of and dealers in electrical equipment and accessories of all kinds, etc. Directors: B. Beddoes and R. Wolstenholme. Regd. office: 82, Water Street, Radcliffe, Lancs.

North Star Electrics, Ltd.—Registered 8th April. Capital £3,000. Buyers, sellers, hirers and letters out on hire, manufacturers and repairers of and dealers in new and second-hand domestic and industrial washing machines, drying machines, vacuum cleaners and electrical appliances, etc. Directors: D. Consterdine, D. Earlam, S. N. Bowden and G. Newton. Regd. office: 63, Melbourne Street, Stalybridge, Cheshire.

Dicks (Electrical Installations), Ltd.—Registered 19th April. Capital £7,000. Electrical engineers, etc. Directors: C. F. Weeks, A. F. Fergusson, J. H. Saunders and R. Slade. Regd. office: 11a, Southgate Street, Winchester.

S.A.M.E.S. (Great Britain), Ltd.—Registered 24th March. Capital £2,000. To manufacture, service and deal in all kinds of electrical, electronic, electrostatic and nuclear and atomic apparatus, accessories, reactors and equipment, etc. Directors: Pierre Longy and Dr. A. W. Bright. Solicitors: Theodore Goddard & Co., 5, New Court, W.C.2.

Scott's Electrical Wholesalers, Ltd.—Registered 26th February. Capital £2,000. Directors: C. F. Scott and M. G. Scott. Regd. office: 91, Poole Road, Westbourne, Bournemouth.

Polarents, Ltd.—Registered 26th February. Capital £100. Importers, exporters, distributors and manufacturers of and dealers in mechanical and electrical apparatus, instruments and equipment, refrigerators, vacuum cleaners, television and radio apparatus, etc. Regd. office: 50, Leadenhall Street, E.C.3.

Brierley Hill Electrical Services, Ltd.—Registered 9th March. Capital £3,000. Manufacturers of electrical appliances and apparatus, electro-depositors, etc. Solicitors: Higgs & Son, Brierley Hill.

Victor Barnes & Co., Ltd.—Registered 29th February. Capital £100. Manufacturers of and dealers in electric, fluorescent and tungsten lamps, etc. Directors: L. G. Pizzey and P. J. Maginn. Regd. office: 44, Bedford Row, W.C.1.

Spooners (Electrical), Ltd.—Registered 10th March. Capital £1,000. Manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. Directors: W. C. H. Spooner and Mrs. Mary S. S. Spooner. Regd. office: 23, Hubert Road, Selly Oak, Birmingham, 29.

Stanley M. Smith (Electrical), Ltd.—Registered 10th March. Capital £1,000. Electrical engineers, etc. Directors: S. M. Smith and Mrs. Linden Smith. Regd. office: Benefit Buildings, Moorhead, Sheffield, 1.

Markwells (Electrical Supplies), Ltd.—Registered 10th March. Capital £100. Directors: A. J. Markwell and Rita M. R. Wells. Regd. office: 32, Laburnham Road, Maidenhead, Berks.

Probectors, Ltd.—Registered 18th March. Capital £1,600. Manufacturers of and dealers in electrical and electronic and nuclear equipment, etc. Directors: G. A. Elsmore, H. S. Stevens and F. G. Hawkins. Regd. office: Bucklersbury House, Bucklersbury, E.C.4.

Park Appliances, Ltd.—Registered 12th February. Capital £160. Retailers, distributors, wholesalers, manufacturers of and dealers in washing machines, electric irons, fans, refrigerators, etc. Directors: H. C. Webb and Mrs. Annie E. Nunn. Regd. office: 30, Clarendon Road, Harrow, Middx.

H. Lilley & Co., Ltd.—Registered 4th March. Capital £100. Electrical engineers, etc. Directors: H. Lilley and Mrs. Doreen C. Lilley. Regd. office: 2, Thaxted Road, S.E.9.

S. Dapin, Ltd.—Registered 7th March. Capital £100. Manufacturers of and dealers in electrical goods, etc. Directors: S. Dapin and Patricia J. Dapin. Regd. office: 47, Bruce Street, Leeds, 12.

Spalding Electrical, Ltd.—Registered 14th March. Capital £1,000. Manufacturers of and dealers in electrical, radio and mechanical apparatus, etc. Directors: G. B. Spalding and Mrs. Madeline E. Spalding. Regd. office: 354, Lower Addiscombe Road, Croydon.

Stonelectric, Ltd.—Registered 14th March. Capital £8,000. Retailers and wholesalers in radio and television sets, radiograms, refrigerators, washing machines, etc. Directors: A. J. Stonell and R. A. Stonell. Regd. office: 7, Whielden Street, Amersham, Bucks.

Parkers Electrical Services (Smethwick), Ltd.—Registered 15th March. Capital £200. Manufacturers of and dealers in electric light fittings, etc. Directors: V. G. Parker and G. M. F. Cowley. Regd. office: 430, High Street, Smethwick, 40.

G. A. Gruby, Ltd.—Registered 15th March. Capital £100. Electrical equipment specialists, etc. Directors: G. A. Gruby and Margaret Gruby. Regd. office: 12, Mosley Street, Newcastle-on-Tyne, 1.

Mansfield & Oliver, Ltd.—Registered 23rd March. Capital £1,000. Electrical contractors and engineers, etc. Directors: K. P. Mansfield and R. V. Oliver. Solicitors: Cunnington, Son & Orfeur, Braintree.

Increases of Capital

Electrical Installations, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £150,000.

Lionel Robinson & Co., Ltd.—Increased by £25,000, in 60,000 shares of 6s and 14,000 ordinary shares of 10s each, beyond the registered capital of £25,000.

J. Langham Thompson Group, Ltd.—Increased by £16,100, in £1 shares, beyond the registered capital of £250,000.

Bankruptcies

W. H. Thomas, 6, Blaenau Road, Llandybie, Carmarthen, electrical contractor.—Public examination 10th June at the County Court Offices, 14, King Street, Carmarthen.

J. J. Franey and **E. L. Bailey,** carrying on business in co-partnership at 77, Barnsley Road, South Elmsall, Yorks., under the style of Regent Electrical Co., electrical dealers.—Public examination 29th June at the Court House, Wood Street, Wakefield.

D. H. Rees, Brodog Lane, Fishguard, electrical contractor.—Trustee, Mr. S. Chater, 35, Windsor Place, Cardiff, appointed 14th April.

A. C. Sewell, trading as A. C. Sewell & Co., at 56, White Lion Street, London, N.1, electrical contractors.—Receiving order made 14th April on debtor's own petition. Public examination 3rd June at Bankruptcy Buildings, Carey Street, London, W.C.2.

F. M. Hitchcox, lately carrying on business as an electrical contractor under the style of Burroughs Electrical Co., and as B.E. Co., at 2a, Langley Road, Watford, and formerly from 18, King Street and 1, Church Street, Watford.—Trustee, Mr. B. Phillips, 76, New Cavendish Street, London, W.1, released 5th April.

A. S. Evans, 24, Linnell Road, Camberwell, London, S.E.5, and residing and carrying on business at "Wayside," West Road, Bridport, Dorset, electrical contractor.—Receiving order made 22nd April on debtor's own petition. First meeting today (Friday) and public examination 16th June at Bankruptcy Buildings, Carey Street, London, W.C.2.

C. W. A. Hales, lately carrying on business at "Robden," Hoyal Road, Hamworthy, Poole, Dorset, electrical engineer.—Order made 6th April suspending discharge for nine months until 6th January, 1961.

W. A. Carter, lately carrying on business as an electrical engineer at 95, Hambalt Road, Clapham, London, S.W.4.—Trustee, Mr. W. J. W. Hill, 58-61, York Terrace, Regent's Park, London, N.W.1, released 26th April.

K. G. W. Warren, 31, Little Horton Lane, Bradford, trading as Falcon Sales Organisation, as an electrical appliance dealer.—First and final dividend of 1s 0⅝d in the £, payable at the Official Receiver's office, 20, North Parade, Bradford, 1.

A. L. Lankester, 65, St. Thomas's Road, Worthing, building and electrical contractor.—Trustee, Mr. J. S. Bradley-Hole, 7, Old Steine, Brighton, appointed 29th April.

Liquidations

Dowson Hird & Edkins, Ltd., electrical engineers, 40, Market Place, Bishop Auckland.—Winding up voluntarily. Liquidator, Mr. H. Wood, Royal George Chambers, Victoria Street, Bishop Auckland, appointed 25th April.

Faith Electrics, Ltd., dealers in electrical equipment, Grand Buildings, Trafalgar Square, London, W.C.2.—Winding up voluntarily. Liquidator, Mr. M. R. Frankel, 13, Park Place, London, S.W.1, appointed 4th April.

GENERATION and DEVELOPMENT

Transfer of Smoke Control Powers

Under Orders made by the Minister of Housing and Local Government, which come into effect on 23rd May, control over smoke, grit and dust from Clarence Dock and Lister Drive power stations is transferred from H.M. Alkali Inspectors to the Liverpool City Council, and from Stuart Street power station and the producer gas plant at the Openshaw works to the Manchester City Council. A further Order transfers to the Sheffield and District Clean Air Committee control over smoke, grit and dust from air and rotary furnaces for iron and steel, electricity works, producer gas works, certain ceramic works and electric arc furnaces up to 30 tons capacity. Gas and coke works, blast furnaces and open hearth furnaces are excluded.

The Minister has refused applications made by six other local authorities (Reading, West Bromwich, Jarrow, Luton, Redcar and Stalybridge) for the transfer of control in respect of certain processes. No other applications have been made.

Goliath Crane Film

A new film describing the design, construction, manufacture and erection of a Goliath crane was recently shown in London by Babcock & Wilcox, Ltd. The subject of the film is a 250ft-high crane with a span of 250ft and a capacity of 400 tons. A colour sequence shows the delivery of the crane members by sea and road to Hinkley Point nuclear power station. The 640-ton main beam is then shown being lifted into its final position 240ft above ground, and the film concludes with the completed crane lifting one of the steam-raising units from the fabrication area, travelling nearly ¼ mile and placing the unit in its final position.

Preservation v. Development

The National Trust for Scotland is to urge the Secretary of State to set up a Council for Places of Natural Beauty in Scotland. It is also pressing for a reappraisal by the Government of hydro-electric schemes and suggests that objections should in future be heard at the expense of the developer. The Earl of Wemyss and March, chairman, speaking at the annual meeting of the Trust at Kirkcaldy, said that everything was weighted in favour of the would-be developer. The "checks and balances" which the British were famed for contriving in most spheres of government were not to be found in this most important element of their administration. The North of Scotland Hydro-Electric Board was rightly proud of its achievements but it was an inescapable fact that less and less of the Highland countryside was being left in its natural state. When there was no foreseeable end to such development it must give cause for national concern.

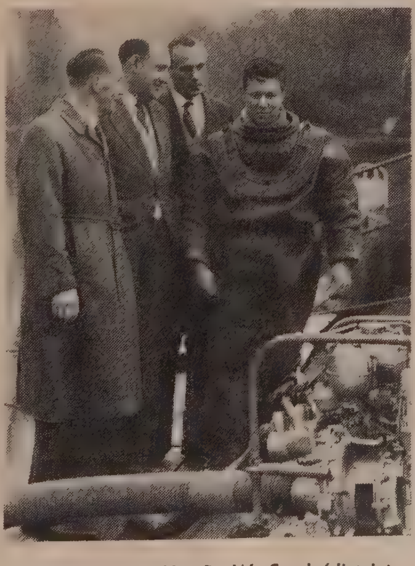
Underfloor Heating for Large Glasgow Scheme

Glasgow Corporation Housing Committee on 2nd May approved plans for building 429 dwellings on the site of Duke Street prison, now almost demolished, at an estimated cost of £1,250,000. There will be three blocks of 12, 14 and 15 storeys, and eleven smaller tenements of two to four storeys. All the houses will have electric under-floor heating. To be named the Ladywell scheme, it will take about two years to complete.

Diver Lays Cables Under Avon

Last week two 33 kV cables and two pilot cables were laid in the River Avon at Bath as part of a scheme to reinforce and improve power supplies to the city. Mr. R. W. Steel, the South Western Electricity Board's district manager, said that the mains were being brought from Norrington grid supply point near Melksham, across the river to Dolmeads substation in the city, and work was going ahead in record time.

Using a high-pressure water jet from a pump provided by the Bath Fire Service, a diver drove a channel 2ft deep through mud and roots across the river bed. The cables were then winched across the river and lowered under water into the trench. The diver next turned a suction funnel, driven by the pump, on to the cables, sucking up 450 gal of slush and silt a minute from the trench, and bedded down the cables. Finally bags of cement were laid over the cables. This technique was developed by the Board's Central Construction Department.



Left to right: Mr. R. W. Steel (district manager, Bath), Mr. D. Horn (engineer-in-charge, Central Construction Department) and Mr. C. J. Thompson (district engineer) with the diver, Mr. K. Thompson, after the completion of cable laying across the Avon

OVERSEAS

Irish Board's Output Up 10 Per Cent

The *Irish Times* reports that the Electricity Supply Board generated 2,094 million kWh in the year ended 31st March last. This was over 10 per cent more than in 1958-59 when a total of 1,898 million kWh was generated or purchased.

Tin Output Decline Affects Electricity Sales

For the first time in the ten years of its existence the Central Electricity Board of Malaya, in its report for 1958-59, records a reduction in sales, amounting to just over 2 per cent. This was wholly due to the limitation of tin output under the International Tin Agreement which has operated to a varying extent since December, 1957; at one stage tin output was cut to less than half the normal level.

Tin mining is by far the largest electricity-consuming industry in Malaya, usually taking more than half the electricity produced in the Federation. Over the last three years, however, the industry's consumption has fallen from 567·2 million to 335·6 million kWh, the latter figure representing about 40 per cent of the Federation's total sales in 1958-59—793·9 million kWh—which showed a decline of about 15 per cent.

The C.E.B., of which Mr. J. Sharples, B.Sc.(Eng.), M.I.E.E., is general manager, distributed 56 per cent of the electricity supplied in the Federation during the year ended 31st August last. In spite of the setback, the 448 million kWh sold was four and a half times as much as in the Board's first year of operation. The report adds that at the end of the year there were encouraging signs of recovery. A rapid expansion in demand by new light industries is reflected in the rise of 17 per cent in power sales, and domestic consumption increased by 8 per cent.

The Board's new 20 MW oil-fired station at Malacca (ultimate capacity 40 MW) was commissioned in April, 1959. Orders were placed for the extension of the Butterworth power station by the installation of two 3 MW "free piston" gasifier sets.

The most important project now in hand is the Cameron Highlands hydro-electric scheme, the contract for the main civil engineering works for which was awarded to two German firms. The scheme involves the bringing together of the waters of four rivers on the Cameron Highlands plateau about 100 miles north of Kuala Lumpur. A 75 MW underground station will be built at Jor and a 4·3 MW intermediate station at Habu. In about 1970 it may be necessary to commence the construction of the second stage of the Cameron Highlands project—the Batang Padang scheme—which would make available a further 100 MW, and a detailed investigation has already been begun.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

SUNDAY, 15th MAY to WEDNESDAY, 18th MAY

Harrogate. — Illuminating Engineering Society. Summer meeting.

MONDAY, 16th MAY

Bristol.—Grand Hotel, 8 p.m. A.S.E.E. Bristol and West of England Branch. "Waterworks Installations."

Ipswich.—Electric House, 7.15 p.m. Ipswich and District Electrical Association. Annual general meeting.

London.—Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. Annual meeting, followed by films.

John Adam Street, Adelphi, W.C.2, 6 p.m. Royal Society of Arts. Second of three Cantor Lectures on "Energy." "The Power System," by F. H. S. Brown.

Stafford.—Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. Annual general meeting, followed by "The Characteristics and Protection of Semiconductor Rectifiers," by D. B. Corbyn and N. L. Potter.

TUESDAY, 17th MAY

Oxford.—Employment Exchange, 7.30 p.m. A.S.E.E. Oxford and Districts Branch. Annual general meeting.

Reading.—A.S.E.E. Reading and Districts Branch, 2.30 p.m. Visit to Huntley & Palmers' biscuit factory.

South Farnborough.—Queen's Hotel, 7.45 p.m. A.S.E.E. Aldershot and Districts Branch. "High Voltage Porcelain Insulators."

WEDNESDAY, 18th MAY

Birmingham. — I.E.E. South Midland Centre. Summer visit to see Crewe-Manchester railway electrification.

Leicester.—Institute of Physics, Midlands Group. Visit to A.E.I. Lamp & Lighting Co. laboratories, followed by a lecture on "Artificial Light Sources for Colour Matching and Allied Problems."

London.—At the Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 7 p.m. Institution of Plant Engineers, London Branch. "Factory Safety."

45, Great Peter Street, S.W.1, 7 p.m. Women's Engineering Society, London Branch. "Electronic Weighing," by Miss R. Winslade.

Newcastle-upon-Tyne.—Roadway House, Oxford Street, 7 p.m. Society of Instrument Technology, Newcastle Section. Annual general meeting.

Rochester.—King's Head Hotel, High Street, 7 p.m. Institution of Plant Engineers, Kent Branch. "Use of Liquid Petroleum Gas," by A. G. Turner.

Sheffield.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. Annual general meeting, followed by "The Design of Housing-Estate Distribution Systems using a Digital Computer," by Dr. R. L. Grimsdale and P. H. Sinclare.

THURSDAY, 19th MAY

Birmingham. — Engineering Centre, Stephenson Place, 10.15 a.m. Combustion Engineering Association, Midland Region. Discussion on "The Automatic Boiler House," opened by M. A. Beechly.

Blackburn.—Castle Hotel, 7.30 p.m. Institution of Plant Engineers, Blackburn Branch. "Some Medium Sized Boiler Houses," by G. A. Rooley.

Cardiff.—Park Place, 6 p.m. South Wales Institute of Engineers. "The Aberthaw Power Station," by W. Wilde.

London.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Annual general meeting, followed by "Technical Features of a New Television Studio at Wembley," by Dr. A. M. Spooner.

32, Welbeck Street, W.1, 8 p.m. British Institute of Radiology. "Silvanus Thompson Memorial Lecture," by Dr. V. E. Cosslett.

FRIDAY, 20th MAY

Coventry.—E.M.E.B. Sports and Social Club, Merrick Lodge, Sandy Lane, 7.30 p.m. A.S.E.E. Coventry and District Branch. Annual general meeting.

London.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle meeting.

London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 7 p.m. British Institution of Radio Engineers. Students' meeting. "Servo-mechanisms and Electronic Engineers—the Present and the Future," by M. James.

FRIDAY, 20th MAY to SUNDAY, 22nd MAY

Birmingham.—Plastics Institute. Summer meeting.

Scarborough.—Royal Hotel. A.S.E.E. Annual conference.

FRIDAY, 20th MAY to MONDAY, 23rd MAY

Llanwrtyd Wells.—Abernant Lake Hotel. I.E.E. Western Centre. Summer meeting.

Pitlochry.—I.E.E. Scottish Centre. Spring meeting.

SATURDAY, 21st MAY

Cambridge.—I.E.E. Supply Section visit.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 27th May:—

ETL (design). No. 773,246. Class 9. Telecommunication apparatus and instruments; switches, relays, contacts, interrupters, distribution boxes, distribution blocks, connections, terminals, plugs, sockets, safety fuses (cutouts), buzzers, bells, resistances, transformers, inductors, coils and transmission systems; cold cathode tubes (not for lighting purposes); electrical apparatus and instruments for measuring, counting and signalling; electrical and electronic apparatus and instruments, all for use in the nuclear industry for measuring purposes, and for use in the supervision of industrial apparatus, and machines for automatically controlling the operation of such apparatus and machines and for giving audible or visual warning of failures in their operation; and electric cables and insulated electric wire.—Ericsson Telephones, Ltd., 22, Lincoln's Inn Fields, London, E.C.4.

Igetric (design). No. 795,129. Class 9. Electrical apparatus and instruments.—General Electric Co., Schenectady, N.Y., U.S.A. Address for service, c/o Allam & Tregear, 2-3, Norfolk Street, Strand, London, W.C.2.

Platanium. No. 800, 091. Class 9. Electrolytic and electrostatic electrodes.—Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.

Litter-Vac. No. 795,200. Class 9. Sweeping machines and dust collecting machines, all being electrically operated and for domestic use; electrically operated vacuum cleaning machines; and parts.—R. G. Dixon & Co., Ltd., Capitol Works, Empire Way, Wembley, Middx.

Hewlett-Packard. No. 779,296. Class 9. Measuring, counting, recording and testing apparatus and instruments; all being electronic apparatus; and parts.—Hewlett-Packard Co., Palo Alto, Cal., U.S.A. Address for service, c/o A. M. & Wm. Clark, 5, Stone Buildings, Lincoln's Inn, London, W.C.2.

Pamrex. No. 800,581. Class 9. Radio and television apparatus; sound recording, sound reproducing and sound amplifying instruments; public address systems; electric amplifiers, batteries, accumulators, microphones, loudspeakers, gramophones, radio gramophones, record players, etc.—Pam (Radio & Television), Ltd., 295, Regent Street, London, W.1.

Pulsonic. No. 798,981. Class 9. Electric and electronic welding apparatus and electrodes for electric and electronic welding.—British Refrasil Co., Ltd., Stillington, Stockton-on-Tees.

A.E.I. (design). No. 785,588. Class 9. Electrical apparatus for surgical, medical, dental and veterinary purposes.—Associated Electrical Industries, Ltd., 33, Grosvenor Place, London, S.W.1.

Brillight. No. B792,667. Class 11. Electric light fittings and parts.—E. Brill, Ltd., 125a, Northcote Road, London, S.W.11.

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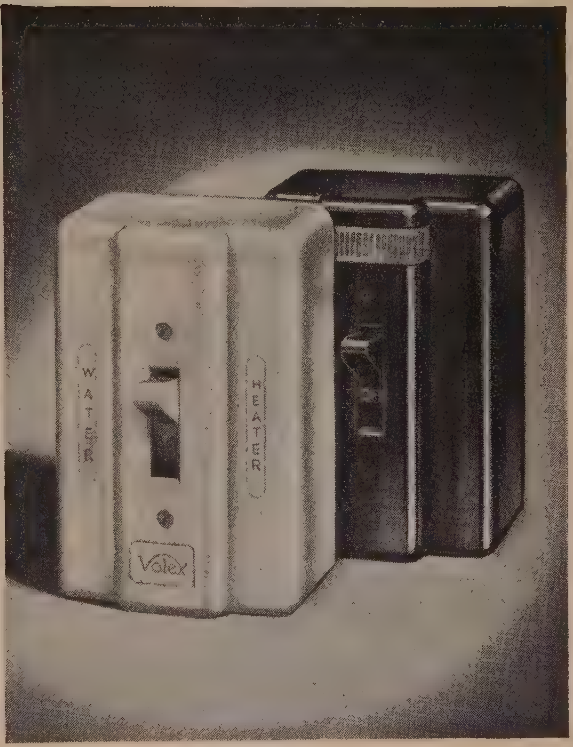

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V/5303	Without Pilot light ...	6/8d. each
V/5303CR	,, ,, Cream	7/8d. ,,
V/5304	With Pilot light	9/- ,,
V/5304CR	,, ,, Cream	10/- ,,

30 AMP. A.C.

V/5203	Without Pilot light ...	7/8d. each
V/5203CR	,, ,, Cream	8/8d. ,,
V/5204	With Pilot light ...	10/- ,,
V/5204CR	,, ,, Cream	11/- ,,

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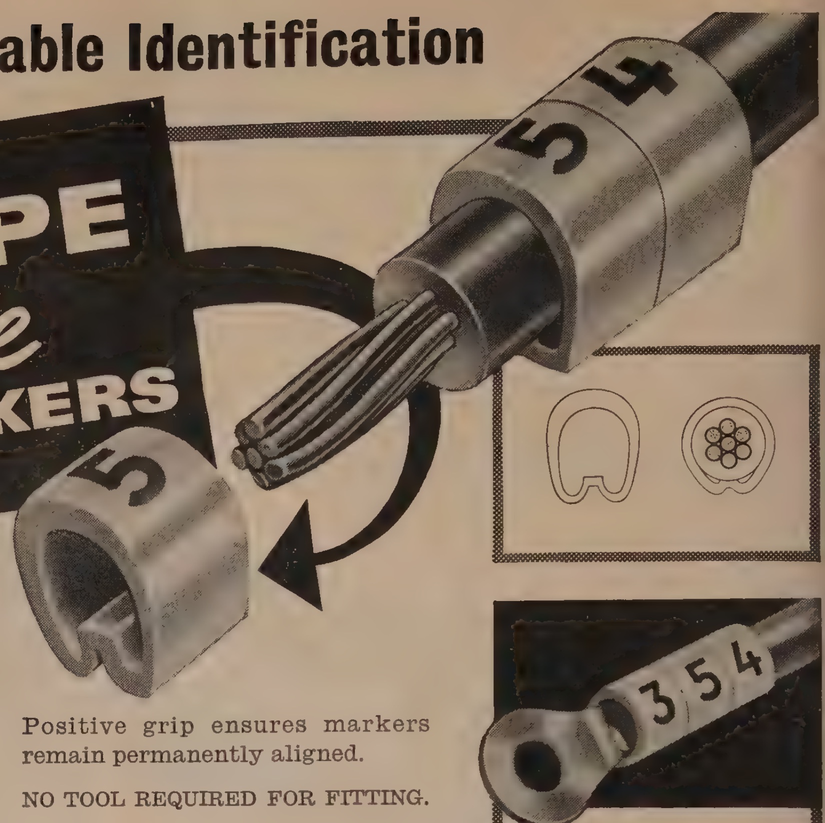

When used with compression-type terminations, the marker can be slipped over the shank to provide insulation protection.

- ★ Grips the cable firmly.
- ★ Any number of markers can be used according to the code required.
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- ★ Positive grip ensures markers remain permanently aligned.
- ★ NO TOOL REQUIRED FOR FITTING.

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V4

NEW ELECTRICAL EQUIPMENT

Colour Lamps

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2, announce that their "Colour 34" fluorescent lamps, previously obtainable only in limited quantities in this country, are to be made more generally available. The lamps differ from the ordinary fluorescent types in that they have two layers of phosphor coating instead of the usual single layer. They are claimed to be similar in colour appearance to the "Natural" lamps but colour rendering is much improved. They are available in all normal ratings from 20 W 2ft to 80 W 5ft and all have an earthing strip and a silicone coating for universal operation. "Colour 34" lamps will be sold at the same price as other colours.

Lighting Controller

The "Mayklite" automatic lighting controller announced by Mayra Electronics, Ltd., 551, Holloway Road, London, N.19, is a photo-electric device which will make or break a circuit, depending on the degree of daylight intensity, for controlling factory, office or warehouse lighting and illuminations, floodlights and neon signs. The photocell is either housed in the control unit (as in models M and MT) or in the sensing head (as in models MS and MTS). A time switch is incorporated in the models MT and MTS as a master switch to allow the controller to be made operative between certain hours.

The main relay in the control unit for switching the power circuit has a contact rating of 10 A. Up to three sensing heads can be connected to one control unit so that the lights in a building can be switched off or on when daylight at any one part of the building reaches a pre-determined degree. The prices vary from £7 for the model MS to £18 for the model MT. Sensing heads are £3 each.

Lighting Reflector

A clip-on reflector designed to convert a g.l.s. lamp into an efficient spotlight has been developed by Courtney, Pope (Electrical), Ltd., Amhurst Park Works, Tottenham, London, N.15. The new reflector, the "Controlite," has an extended neck and, when combined with an S.K. spotlight fitting, forms an attractive unit. The S.K. fitting is adjustable and can be moved 360° in the horizontal plane and 180° in the vertical plane.

Coupled with the introduction of the new "Controlite," the company also announces price reductions. The S.K. spotlight fitting with e.s. lampholder has been reduced to 16s (previously 19s) and with b.c. lampholder to 12s 6d (previously 15s). The "Controlite" reflector unit, with short neck, now costs 13s 6d (previously 15s) and the new "Controlite" reflector unit, with long neck, is priced at 15s 6d.

Radiant Glass Heater

A new version of the Ekco radiant glass "Thermopanel" heater will be available from E. K. Cole, Ltd., Southend-on-Sea, Essex, for the next heating season. It will have a bigger illumination unit and will provide a source of radiant heat enhanced by a warm, soft glow over the entire panel. The 1 kW element is fused directly to the back of a toughened glass panel and models will be available for both wall mounting and floor standing.

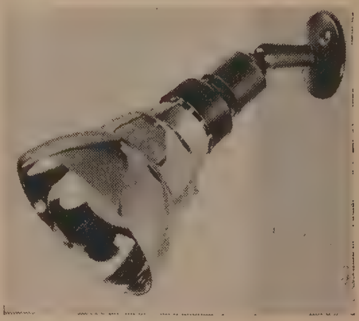
Domestic Fluorescent Fittings

A new range of domestic fluorescent lighting fittings is announced by Bull Electrical, Ltd., Sutton Road, Eastbourne, Sussex. Known as the "Saturn" range, the fittings are designed around circular tubes and cover both the 80 and 40 W sizes. By the use of plastics for the bowls and light alloy for the framework, the weight has been kept to the minimum. A special hook device facilitates attachment to the ceiling rose and the framework holds the tube in a central position and also provides the fixing for the choke and control gear.

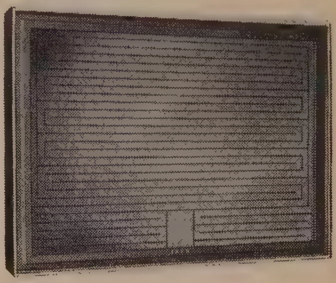
The two translucent bowls that comprise the top and bottom of the fitting are available in a variety of colours and the fluorescent tube, not being screened, gives a pleasant, warm light. The respective prices, including tube and purchase tax, are £6 19s 6d (80 W) and £6 9s 6d (40 W).

Food Mixer

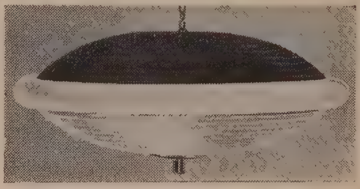
A new competitively priced food mixer, provided with stand, turntable, bowl, twin beaters, whisk and twin dough hooks, is now being marketed by Bylock Electric, Ltd., 109, South Street, Enfield, Middlesex. The machine can be easily detached from its mounting and used in the hand as a portable model. It is fitted with a three-speed switch control and the bowl rotates automatically. The



Courtney, Pope "Controlite" reflector with the S.K. spotlight unit



Ekco "Thermopanel" radiant heater (E. K. Cole, Ltd.)



Bull Electrical "Saturn" fluorescent lighting fitting

Bylock food mixer

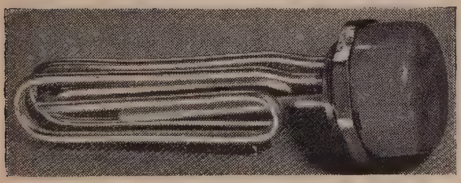
motor, suitable for use on a.c./d.c. supplies, is housed in a neat white plastic casing, and the switch and metal base-plate of the stand are in red. The mixer is guaranteed for twelve months and the price is £9 4s plus £1 13s 8d purchase tax.

Roasting Spits

The new range of "Grill-King" electric roasting spits now available in this country from Valentine Equipment, Ltd., 185, King's Road, Reading, Berks., consists of three models, each claimed to be the fastest of its type owing to the use of improved infra-red heating elements. The spits roast, fry, grill and toast and each can take two or three birds. The loading is 1,500 W.

The "Automatic-Lux" model is fitted with a timer control clock, two indicator lights and push-button switches, and the finish, including the lid, is in chromium plate. The accessories include a spit with meat hooks, a roaster/toaster, glass dish and stand and a warming pan. The oven space is 15½in long by 10½in deep by 9½in high. The "Automatic" model is similar but has stove enamelled side panels, while the "Popular" model is fitted with one control light only and a turning switch. All models are designed for operation on 240 V and the respective prices are £29 10s, £27 10s and £21.

Valentine "Automatic-Lux" model "Grill-King" roasting spit



A.E.I.-Hotpoint type EL immersion heater

Brown Brothers "Duco" "Competition" vacuum cleaner

Immersion Heaters

The type EL and EO immersion heaters, just introduced by A.E.I.-Hotpoint, Ltd., 33, Grosvenor Place, London, S.W.1, will supersede the company's CJ and CK types. They are available in 200/230 V and 230/250 V ranges and with 1, 2, 2·5 and 3 kW loadings. The immersed lengths are 10, 27, 30 and 36in and intermediate lengths are obtained by bending the standard 27in elements on site. The heater has an unbreakable snap-on moulded terminal cover and its electrolytic bright finish is claimed to give improved protection against corrosion and better heat transfer. The transfer of heat from spiral to sheath is also improved by two-stage compacted insulation. Both of the new types, in immersed lengths from 10 to 30in, are priced at £1 19s 10d plus 7s 6d tax and the 36in length costs £2 4s 10d plus 8s 5d tax.

The type EL heater is suitable for the Satchwell VK and the Maclaren MB thermostats and type EO for Sunvic TQB type thermostats. Satchwell thermostats cost from 19s 6d to £1 1s 6d and Maclaren thermostats from 19s to £1 1s, without pockets, according to length of stem. Sunvic thermostats, without pockets, are priced at 12s.

Vacuum Cleaner

A low priced "Competition" model vacuum cleaner has been added to the "Duco" range obtainable from Brown Brothers, Ltd., Great Eastern Street, London, E.C.2. It is a cylindrical cleaner, covered with leather-finished cloth, and it is driven by a 250 W motor. The accessories include a flexible hose, two extension tubes, oval brush, carpet nozzle and crevice tool. Disposable paper dust bags are available if required and the price, including purchase tax, is £8 19s 6d.

Power Network Protection System

The transistorised voice frequency intertripping system, Type SL.54, introduced by the English Electric Co., Ltd., Marconi House, Strand, London, W.C.2, has been designed as a power system protection link between substations. It employs transistors for low power consumption and logic circuits for reliability of operation, and has been approved by the General Post Office for use on rented circuits. It can also be applied to a channel derived from power line or other carrier systems. Each terminal unit consists of a transmitter, receiver and ancillary units. The transmitter sends out a continuous signal on a given frequency. When a fault is detected, this frequency is shifted and the shift will be detected by the receiver, causing relays to operate, initiating whatever action is necessary.

Two groups of logic circuits are provided. The alarm logic gives warning in the event of faulty operation of the SL.54 equipment and prevents the local switchgear being tripped. The trip logic causes the local switchgear to be tripped only when the trip frequency is detected by the receiver and then only if the alarm logic indicates that the SL.54 equipment is functioning correctly. Alarm is also given if the power supply to the equipment fails. On a normal power line the time taken to relay a signal for tripping a circuit does not exceed 55 msec and under the worst conditions 85 msec. The relay contact rating of the trip relay is 300 mA at 100 V d.c. and that of the alarm relay 2 A at 300 V d.c. Satisfactory operation is achieved within the temperature range −10°C to +55°C.

NICKEL ALLOY BOOKLET

The booklet "An Introduction to Wiggin Nickel Alloys" published by Henry Wiggin & Co., Ltd., illustrates the technical applications of high-nickel alloys. These can be divided into four categories: corrosion-resistant, heat-resistant, electrical-resistance and materials with special properties. The first part of the publication is devoted to these properties of the alloys, explaining how they are assessed, and the latter part illustrates some actual applications. The publication, which is compiled mainly of photographs, is obtainable free on request from the Publicity Department of the company at Thames House, Millbank, S.W.1.

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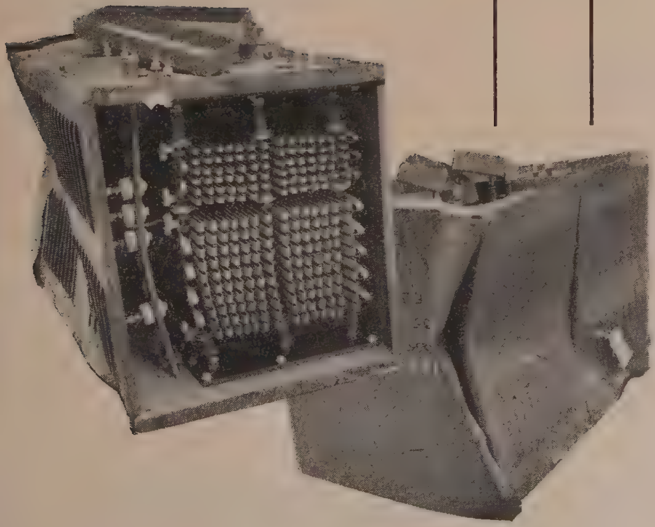

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SWITCH BREAKING CAPACITY 3 times the rating at ·25/·3 power factor

BUSBAR COPPERWORK complies with B.S.159:1957

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1957

9482. Sperry Rand Corporation.—Electron guns. 22nd March, 1957. (833031.)

11727. Vickers-Armstrongs (Aircraft), Ltd., and Firman, R. A.—Electric switches and contact arrangements therefor. 3rd March, 1958. (833038.)

12828. Simplex Electric Co., Ltd.—Electric busbars. 23rd April, 1958. (Cognate application 1786, 18th January, 1958.) (833041.)

13069. Electrothermal Engineering, Ltd. —Flexible electric heaters. 24th July, 1958. (833045.)

13079. General Electric Co., Ltd.—Information indicating apparatus. 24th April, 1958. (833046.)

13420. Svenska Ackumulator Aktiebolaget Jungner.—Electric accumulators. 26th April, 1957. (833047.)

13925. Burndept, Ltd.—Production of electric batteries. 1st August, 1958. (833050.)

15113. Philips Electrical Industries, Ltd. —Ferromagnetic ferrite materials. 13th May, 1957. (833053.)

16095. Oldham & Son, Ltd., and Morton, H.—Electric supply units. 1st April, 1958. (832926.)

17765. Lighters, Ltd.—Electric soldering irons. 28th May, 1958. (833286.)

18590. Siemens & Halske A.G.—High frequency induction furnaces. 12th June, 1957. (833287.)

20913. Sylvania Electric Products, Inc.—Apparatus for feeding filamentary materials. 2nd July, 1957. (833064.)

21923. Siemens & Halske A.G.—Electronic storage tubes. 10th July, 1957. (833070.)

21989. Allday & Son (1922), Ltd., H.—Terminals for electric circuit connections. 16th June, 1958. (833291.)

22149. Sperry Rand Corporation.—Electron discharge devices. 12th July, 1957. (833065.)

22202. Veeder-Root, Inc.—Electrical signalling means for counters. 12th July, 1957. (833374.)

22312. Neosid, Ltd.—Tags for electrical connections. 13th May, 1958. (833292.)

22928. International Computers & Tabulators, Ltd.—Pulse generating apparatus. 19th May, 1958. (833376.)

24468. English Electric Co., Ltd.—On-load tap changing apparatus. 23rd July, 1958. (832934.)

26862. Grusell, A. E.—Devices for absorbing electromagnetic wave energy in transmission lines. 26th August, 1957. (833084.)

28036. Maschinenfabrik Augsburg-Nürnberg A.G.—Apparatus for supplying electric power to the decking trolley in multiple-storey garages through a flexible cable. 5th September, 1957. (832842.)

28381. Siemens Edison Swan, Ltd.—Impulsing relay circuits. 25th August, 1958. (832415.)

28416. National Lead Co.—Method for electrolytic production of refractory metal. 9th September, 1957. (832416.)

28778. Siemens-Schuckertwerke A.G.—Vacuum electric switches. 12th September, 1957. (833386.)

29520. General Electric Co., Ltd.—Thermo-electric devices. 2nd September, 1958. (832422.)

30322. Kidde & Co., Inc., W.—Electro-acoustic transducer. 27th September, 1957. (832847.)

30554. Burgess Products Co., Ltd.—Snap-action devices and electric switches incorporating such devices. 20th August, 1958. (832848.)

31450. B.T.U. (Manufacturers), Ltd.—Control of electric fan motors. 8th October, 1957. (832428.)

31857. Compagnie Générale de Télégraphie sans Fil.—Electromagnetic pulse transmitting and receiving systems. 11th October, 1957. (832649.)

32198. Siemens-Schuckertwerke A.G.—Moderator or reflector substances for nuclear reactors. 15th October, 1957. (833094.)

32604. Compagnie Générale d'Electricité. —High voltage cable installations. 18th October, 1957. (832575.)

32795. Westinghouse Electric Corporation.—Valves. 21st October, 1957. (832732.)

32824. Beckman Instruments, Inc.—Miniature potentiometer and method of manufacturing same. 21st October, 1957. (833095.)

33892. Koppers Co., Inc.—Electrostatic precipitation of particles from gases. 30th October, 1957. (832852.)

36360. M-O Valve Co., Ltd.—Gas-filled thermionic valves. 17th November, 1958. (832938.)

37302. Philips Electrical Industries, Ltd. —Methods of manufacturing ferromagnetic ferrites. 29th November, 1957. (833277.)

39227. Walco Electric Co.—Device for heating wire electrically. 17th December, 1957. (833111.)

40098. Pye, Ltd.—Television cameras. 12th December, 1958. (833300.)

1958

69. Siemens & Halske A.G.—Semiconductor crystal diodes. 1st January, 1958. (832584.)

174. General Electric Co.—Signal translating devices comprising magnetic cores. 2nd January, 1958. (832585.)

1347. British Insulated Callender's Cables, Ltd.—Generation of high voltage heavy current pulses. 13th January, 1959. (833124.)

2089. Deutsche Edelstahlwerke A.G., and Allgemeine Elektricitäts-G.m.b.H.—Method of and apparatus progressively heating metal strip by the direct passage of an electric current therethrough. 21st January, 1958. (833388.)

2111. Ferranti, Ltd.—Data storage apparatus. 22nd January, 1958. (833127.)

2320. Hazeltine Corporation.—Balanced circuit having improved balance. 23rd January, 1958. (833280.)

2688. Bendix Aviation Corporation.—Electrical connector. 27th January, 1958. (832869.)

2719. Marie, G. R. P.—Frequency changers for ultra-high frequency electromagnetic waves. 27th January, 1958. (833130.)

3282. Richardson, F. L.—Glands for sealing electric cables and the like. 31st January, 1958. (832589.)

4416. AMP, Inc.—Insulated electrical connectors and connections. 11th February, 1958. (833133.)

4636. Voigt & Haeffner A.G.—Electric tubular heaters. 12th February, 1958. (833302.)

5125. Bendix Aviation Corporation.—System for preventing mis-mating between pluggable electrical components. 17th February, 1958. (832658.)

5545. Robotron Corporation.—Current compensator control for welding circuit. 20th February, 1958. (833403.)

6198. Pfisterer, W.—Suspension devices for overhead cables. 26th February, 1958. (832594.)

6593. Yardney International Corporation. —Electrode for use in an alkaline electric cell or accumulator. 28th February, 1958. (Addition to 824775.) (832944.)

7213. Babcock & Wilcox, Ltd.—Power plant for nuclear reactors. 6th March, 1958. (832877.)

8524. Bendix Aviation Corporation.—Remote tuning system for radio receiver. 17th March, 1958. (832739.)

9582. Western Electric Co., Inc.—Electric digital-to-analogue convertors. 25th March, 1958. (833407.)

10583. Westinghouse Electric Corporation.—Circuit-breakers. 2nd April, 1958. (832948.)

12747. Philips Electrical Industries, Ltd. —Electric wave generators. 22nd April, 1958. (833151.)

13036. General Electric Co.—Magnetic core and method of making same. 24th April, 1958. (832599.)

13217. Centre National de la Recherche Scientifique.—Ferrite materials and methods of manufacture therof. 25th April, 1958. (833155.)

14051. Standard Telephones & Cables, Ltd.—Multichannel communication system. 2nd May, 1958. (833158.)

14055. General Electric Co.—Television camera apparatus. 2nd May, 1958. (832888.)

14663. Sulzer Freres S.A.—Water power and storage plants. 7th May, 1958. (832452.)

14675. Compagnie Générale de Télégraphie sans Fil.—Signal receivers and amplifiers. 7th May, 1958. (832662.)

14899. Air Reduction Co., Inc.—Electronically controlled time delay apparatus. 9th May, 1958. (833160.)

16394. Ekco-Ensign Electric, Ltd.—Fluorescent lamp fittings. 21st May, 1958. (833412.)

17073. Radio Corporation of America.—Semiconductor devices and methods of making same. 28th May, 1958. (832740.)

17353. Standard Telephones & Cables, Ltd.—Magnetically operated electrical switch. 30th May, 1958. (832667.)

17496. Etablissements Merlin & Gerin S.A.—Isolator switch. 2nd June, 1958. (832893.)

18076. Porter Electrical Products, Ltd.—Clamp for electric conductors. 6th June, 1958. (Addition to 746180.) (833314.)

18635. Ateliers des Charmilles S.A.—Hydro-electric installations. 11th June, 1958. (833414.)

23756. Dalton, H. R.—Galvanic cells or batteries and electrodes therefor. 23rd July, 1958. (832463.)

26299. Standard Telephones & Cables, Ltd.—High voltage cables. 15th August, 1958. (832902.)

26356. International Combustion (Holdings), Ltd.—Arc welding. 15th August, 1958. (833186.)

27310. Telefunken G.m.b.H.—Remote control apparatus. 26th August, 1958. (832954.)

27698. Sylvania Electric Products, Inc.—Light amplifier and storage device. 28th August, 1958. (833188.)

28198. Maschinenfabrik Oerlikon.—Single-anode mercury vapour rectifier. 2nd September, 1958. (832470.)

31927. Babcock & Wilcox Co.—Cyclone furnaces. 7th October, 1958. (832957.)

32912. National Cash Register Co.—Electron permeable window. 15th October, 1958. (833194.)

36917. Fernseh G.m.b.H.—Gain control arrangements for electronic amplifiers. 17th November, 1958. (832961.)

37560. Philips Electrical Industries, Ltd. —Transistor push-pull amplifiers. 21st November, 1958. (833198.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses

Aireborough.—U.D.C. 13th June. Class " B " street lighting equipment. (See this issue.)

Australia.—Shortland County Council. 16th June. Electric cable. (See this issue.)

Bournemouth.—Corporation. 11th June. Improvements to school electrical installations. (See this issue.)

Ceylon.—Tender Board, Ministry of Transport and Power. 25th May. Ceiling fans and bracket-type fans. (E.S.B. 11660/60.)* 1st June. Aluminium conductors and accessories. (E.S.B. 11659/60.)* Circuit-breakers. (E.S.B. 11661/60.)*

Cornwall.—County Council. Electrical services at Camborne Fire Station. (See this issue.)

Costa Rica.—Department de Licitaciones Publicas, la Proveeduria Nacional, San Jose. 4th June. Electrical equipment, including lamps, starters, insulators, switches and fuses. (E.S.B. 12422/60.)*

Durham.—County Council. 20th May. Electric lamps for the year ending 31st August, 1961. G. H. Metcalfe, director of education, Shire Hall.

Ealing.—Corporation. 31st May. Street lighting equipment. (See this issue.)

Ethiopia.—Imperial Board of Telecommunications, Addis Ababa. 15th June. Transmission line material. (E.S.B. 11728/60.)*

Formosa.—Central Trust of China, Taipei. 3rd June. 1,948 lightning arrestors. (E.S.B. 11785/60/I.C.A.)* Power transformers. (E.S.B. 11781/60/I.C.A.)*

Gateshead.—Corporation. Electrical installation in Elgin Mixed Secondary Technical School. (See this issue.)

India.—Mysore State Electricity Board, Bangalore. 14th June. 200 7·2 kV/48 kV, 50 kVAr capacitors. (E.S.B. 11654/60.)*

India Store Department. 9th June. Electric furnace. (See this issue.)

Rajasthan State Electricity Board, Jaipur. 31st May. Transformers ranging from 50 kVA to 2,500 kVA. (E.S.B. 12061/60.)* 8th June. Transformers ranging from 25 kVA to 100 kVA. (E.S.B. 12062/60.)*

Madras State Electricity Board. 7th July. Power cables and control cables. (E.S.B. 12415/60.)*

Kidderminster.—Corporation. 30th May. Group " B " street lighting equipment. (See this issue.)

Kuwait.—Department of Electricity, Water and Gas. 22nd May. 1,250 mercury vapour lamps and 1,100 sodium vapour lamps. (E.S.B. 11790/60.)*

Malaya.—Central Electricity Board. 1st November. Mechanical and electrical plant, including two Francis waterwheels coupled to two 2,750 kW, 11 kV alternators, for Habu power station. (E.S.B. 11789/60.)*

Melton Mowbray.—U.D.C. 1st June. Sewage pumping machinery including electrical equipment. W. H. Radford & Son, consulting engineers, 57, Goldsmith Street, Nottingham.

Middlesbrough.—Corporation. 27th May. Electric lamps, (Tender No. 53) for the year ending 30th June, 1961. Borough engineer, Municipal Buildings.

New Zealand. — Wellington Electricity Department. 25th May. Cable joints and terminations. (E.S.B. 12099/60.)*

Nottinghamshire.—Highways Committee. 3rd June. Lighting of a section of the Great North Road. (See this issue.)

Pakistan.—Purchase Co-ordinating Officer, Posts and Telegraphs, Karachi. 1st June. Underground cables. (E.S.B. 12033/60.)*

Director of Purchase, Water and Power Development Authority, Dacca. 25th May. Transformers and ring main units. (E.S.B. 12036/60.)*

South Africa.—Tzaneen Municipality. 24th May. Water tube boiler and ancillary plant. (E.S.B. 11476/60.)* 2,000 kW steam turbine generator set. (E.S.B. 11477/60.)*

Southend-on-Sea. — Corporation. Electrical installation in St. Bernard's Convent High School for Girls. (See this issue.)

Thailand.—Thai Technical and Economic Co-operation, National Economic and Development Board, Bangkok. 3rd June. 52 transformers ranging from 15 kVA to 50 kVA. (E.S.B. 11727/60/I.C.A.)*

Metropolitan Electricity Authority, Bangkok. 25th May. Cables and cable jointing material. (E.S.B. 11724/60/I.C.A.)* 27th May. Electrical fuses and fusable devices. (E.S.B. 11725/60/I.C.A.)* 30th May. Distribution transformers, ranging from 5 kVA to 100 kVA. (E.S.B. 11726/60/I.C.A.)*

Wanstead and Woodford.—Borough Council. 31st May. Street lighting installations. (See this issue.)

Winchester.—City Council. Street lighting equipment. (See this issue.)

ORDERS PLACED

Birmingham.—Regional Hospital Board. Recommended. Surface and underground cables, switchgear and distribution pillars at Wordsley Hospital, Stourbridge (£14,440).—Lee Beesley & Co. (Birmingham).

Newcastle-on-Tyne.—City Council. 1,200 post-top lanterns (£5,970).—Engineering & Lighting Equipment Co. 1,456 lamp columns (£11,823).—Stewarts & Lloyds. 1,552 time switches (£5,703).—Sangamo Weston.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Brentford.—Works extensions; Brentford Soap Co., Ltd., Catherine Wheel Road.

Brighton. — Laboratory and offices; Tamplins, Ltd., Phœnix Place.

Cambridge.—Swimming pool, with café, kitchen, etc., Donkey's Common; city engineer.

Cardiff.—Flats (45), Fern Place, Fairwater; city architect, 12, Park Place.

Chatham.—Offices, showrooms and workshops, 411-415, High Street; H. Halpern & Associates, architects, 26, High Street, Chatham.

Cheshunt.—Public hall, Windmill Lane; Gray, Conoley & Co., Ltd., Stephenson Street, London, E.16.

Chipping Norton.—Houses (34), Middle Barton and Charlbury; T. Rayson, architect, 29, Beaumont Street, Oxford.

Cranbrook.—Offices and Council Chamber; Keith Barnes, architect, Hill House.

Dewsbury.—Houses (58), West Town development area; borough engineer, Municipal Buildings, Halifax Road.

Durham. — Grammar/technical school, Ferryhill (£250,000); county architect, South Street, Durham.

Eastbourne.—Church, Broad Road, Willingdon; Benz & Williams, architects, 53, Gildredge Road.

Ennerdale.—Housing development at Orgill, Egremont, involving the erection of about 300 houses; surveyor, Council Chambers, Cleator.

Gillingham.—Maisonnettes (40), Saunders Street; borough surveyor.

Gravesend.—Old persons' dwellings (34); borough engineer, 6, Woodville Terrace.

Holywell.—Houses (50), Greenfield Hall estate; W. Isherwood, surveyor, Town Hall, Holywell, Flints.

Hounslow.—Offices, Hanworth Road; Walter Llewellyn & Sons, Ltd., 79, Davies Street, London, W.1.

Llanfyllin.—New offices, including Council chamber and court room; Glyn Jones, clerk to R.D.C., Council Offices, Llanfyllin, Mont.

Middlesbrough.—Bank and offices for District Bank, Ltd.; P. R. Middleton & Partners, architects, 111, Albert Road.

Milford Haven.—Houses, Cromwell Road (74) and Gellyswick estate (31); surveyor, Town Hall.

Morpeth.—Development of Northgate Hospital; P. H. Knighton, chief architect, Newcastle Hospital Board, Benfield Road, Newcastle-on-Tyne.

Newcastle-on-Tyne. — R.C. secondary school, Westbourne Avenue; D. Brown, architect, 10, Lambton Road, Jesmond, Newcastle.

New headquarters for Charles G. S. Buist, Ltd.; Stanley Miller, Ltd., builders, 17, North Street, Newcastle.

Offices, stores, etc., Portland Terrace, for United Automobile Services, Ltd.; Fennell & Baddiley, architects, Bridge End Chambers, Chester-le-Street.

Old people's houses (24), junction of Claremont Road and Hunters Road; G. H. Gray & Partners, architects, 8, Portland Terrace, Newcastle-on-Tyne.

Nottinghamshire. — Secondary modern schools at Warsop and Worksop, and junior school, East Retford; D. E. E. Gibson, county architect, County Hall, Trent Bridge, Nottingham.

Peacehaven.—Home for aged persons, Roundhay Avenue (£70,000); Wm. Willett, Ltd., 12, Grand Avenue, Hove.

Portsmouth.—Works extensions; Dragonair, Ltd., Fitzherbert Road, Farlington.

Reigate.—Four-storey maisonnettes (24), Dome estate, Redhill; borough surveyor, Town Hall.

Richmond.—Showrooms and offices, George Street; Murrayfield Real Estate Co., Ltd., 62, St. James's Street, London, S.W.1.

Seaton Valley (Northumberland).—Houses (48), Cramlington; U.D.C. surveyor.

Slough.—Two-storey extension to Town Hall; borough engineer.

South Shields.—Third stage of Marine and Technical College (£358,000); R. Costain, Ltd., builders, 16, Great North Road, Newcastle-on-Tyne.

Stoke Poges.—Laboratories; Miles Laboratories, Ltd., 41, Piccadilly, London, W.1.

Thingoe.—Houses (28); surveyor, Council Offices, 1, Northgate Street, Bury St. Edmunds.

Wells.—Dwellings (15), Vicarage Road, Wookey; J. Appleyard, clerk, Rural Council Offices, Wookey Hole Road, Wells, Somerset.

Welwyn.—Shops (17) with warehouses and stores, town centre (£130,000); general manager to Development Corporation, 4, Wigmores South, Howardsgate.

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* This information is extracted from the Board of Trade *Export Service Bulletin.* Inquiries should be addressed to the Board of Trade, Export Services Branch, Lacon House, Theobald's Road, London, W.C.2 (Telephone: Chancery 4411, Ext. 738), quoting the reference given.

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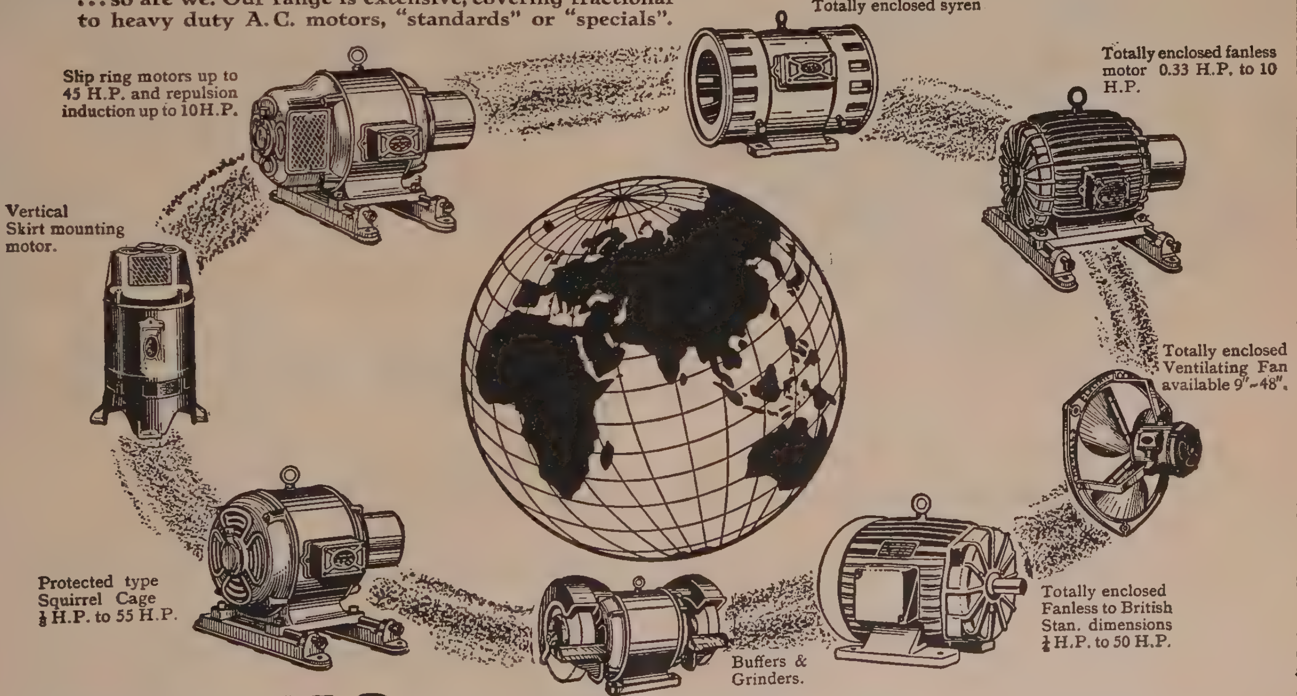
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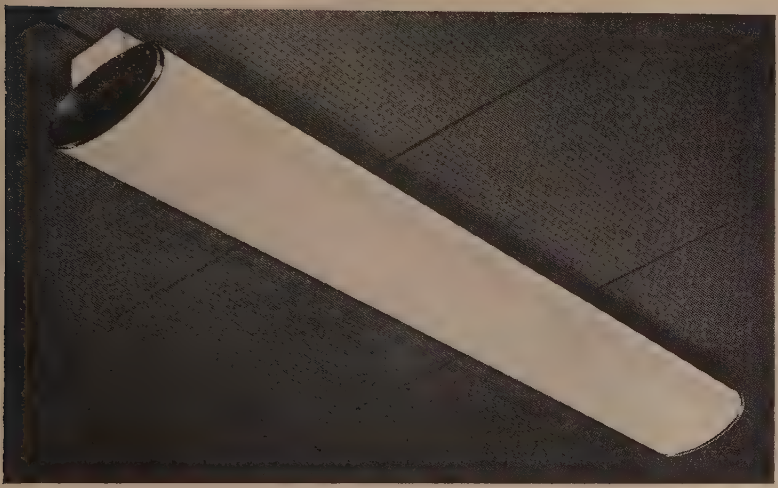

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F2231/2/8060	10 6 4	6 1 11	1 2 4	17 10 7
F2232/1/8060	6 10 11	5 19 0	1 1 10	13 11 9
F2232/2/8060	10 6 4	5 19 0	1 1 10	17 7 2
F2233/1/8060	6 10 11	5 11 0	1 0 4	13 2 3
F2234/1/8060	6 10 11	6 13 5	1 4 5	14 8 9
F2234/2/8060	10 6 4	6 13 5	1 4 5	18 4 2
F2235/1/8060	6 10 11	15 15 5	2 17 9	25 4 1
F2235/2/8060	10 6 4	15 15 5	2 17 9	28 19 6
F2238/2/8060	10 6 4	10 1 11	1 17 0	22 5 2
F2239/1/8060	6 10 11	8 4 2	1 10 1	16 5 3
F2239/2/8060	10 6 4	8 4 2	1 10 1	20 0 7

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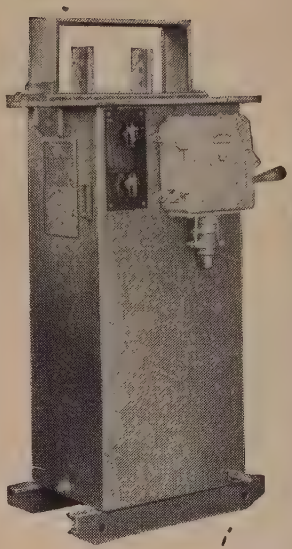

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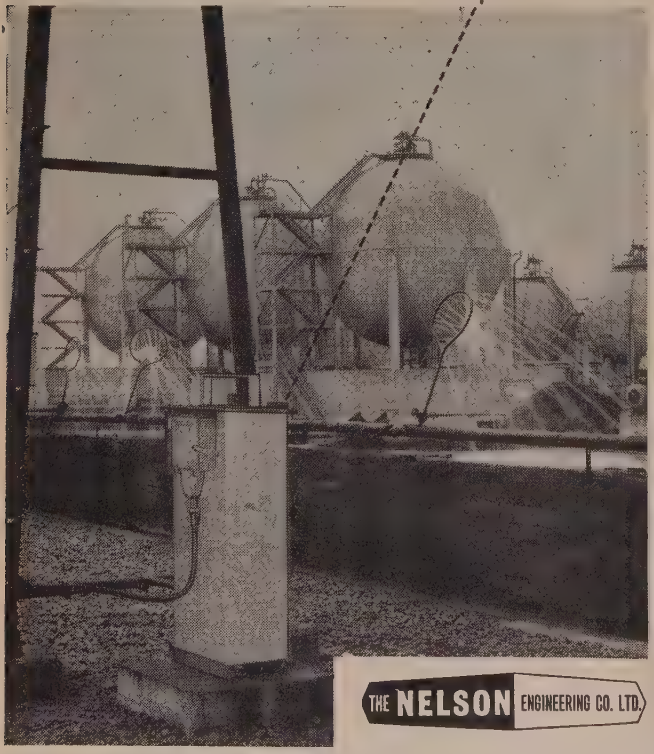

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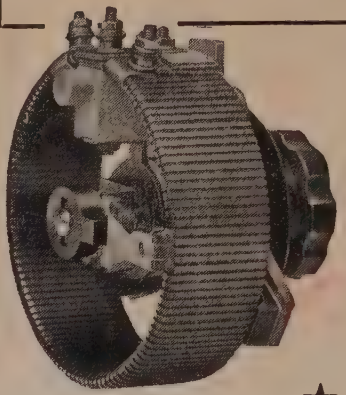

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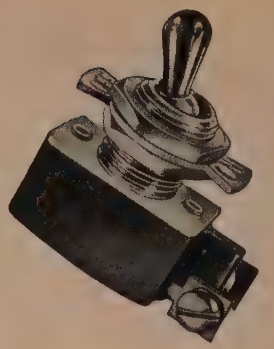

G.600

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M.30: 10-AMP Toggle Switch.

A.55: Refrigerator Door Switch.

S.254: A.C. only 10-amp Toggle Switch, double pole.

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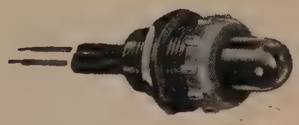
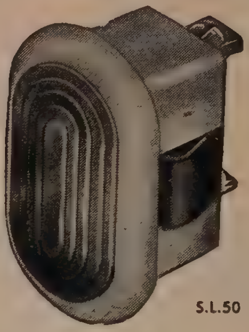
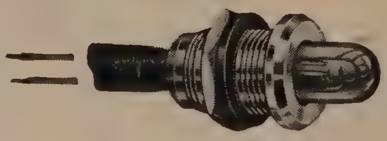


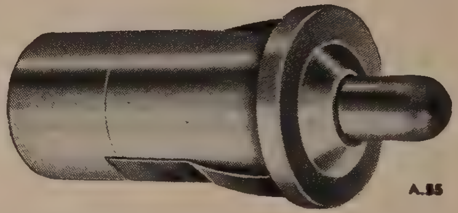
S.L.160



S.L.50



S.L.162



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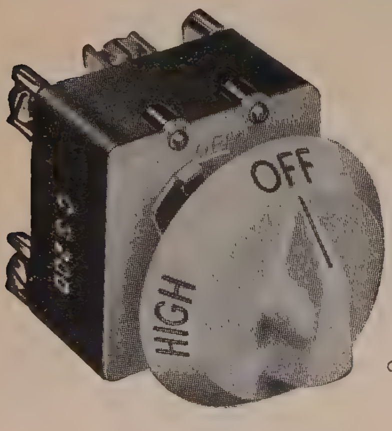
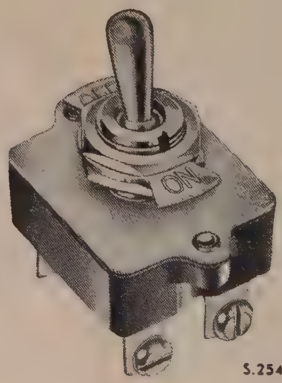
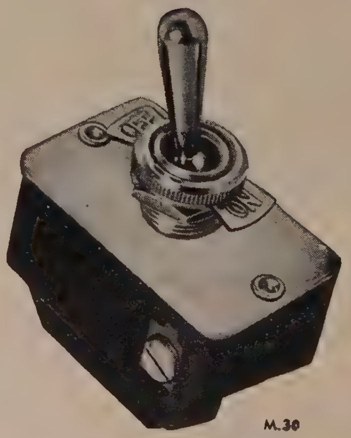


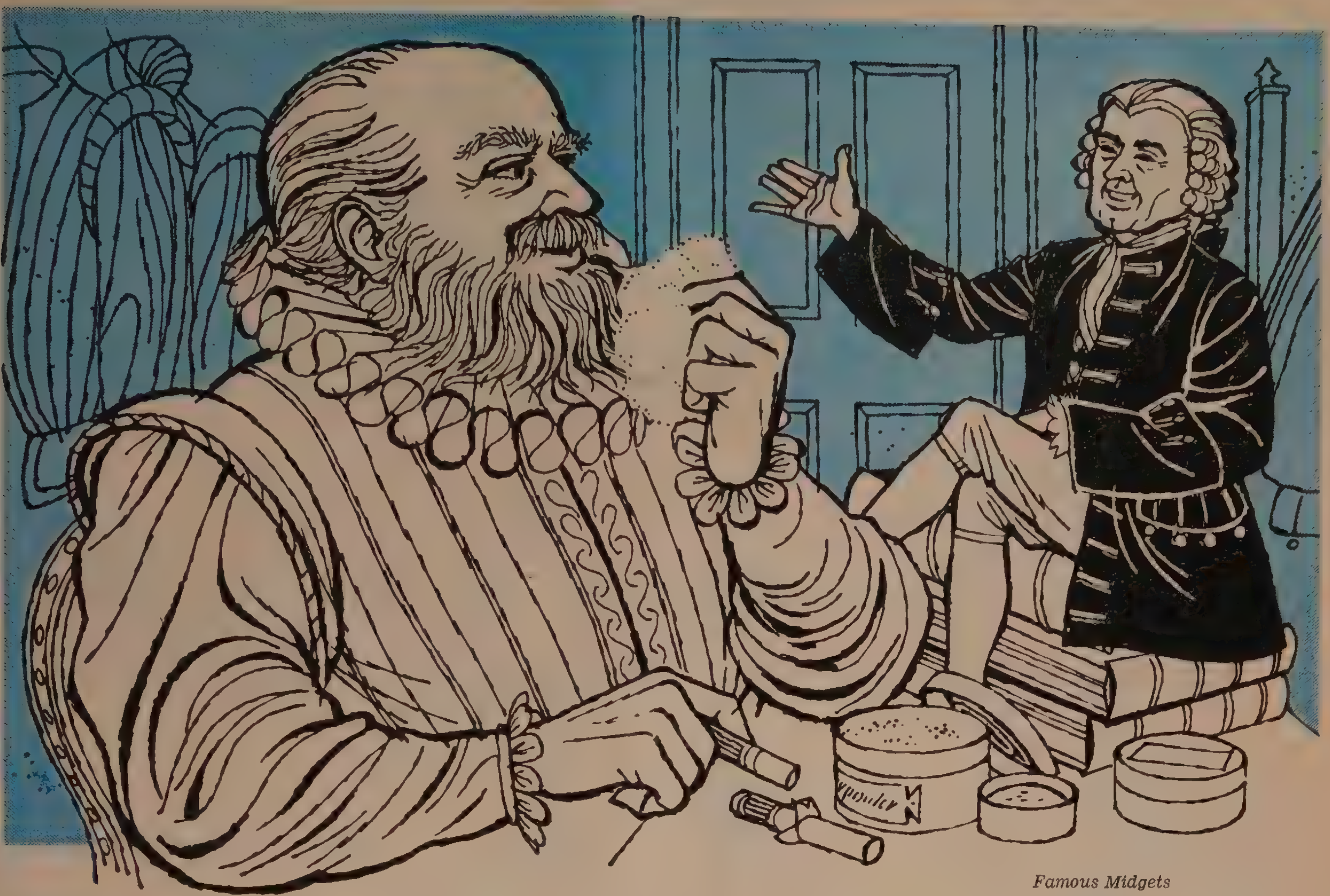
C.S.200



S.254



M.30



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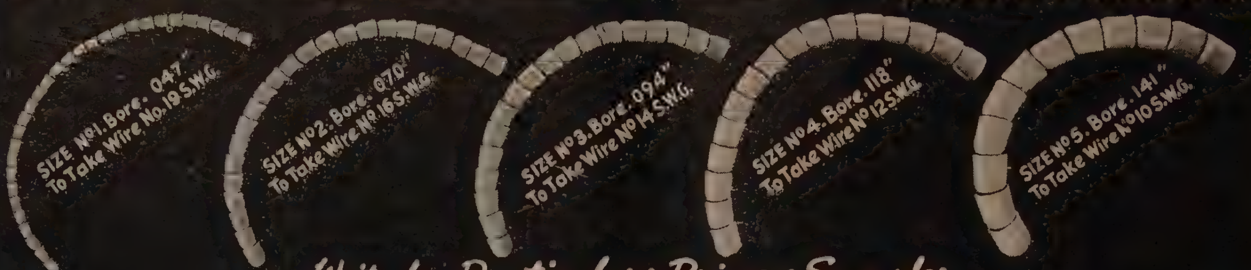
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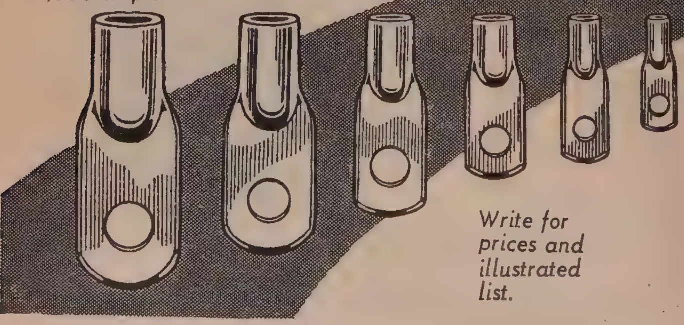
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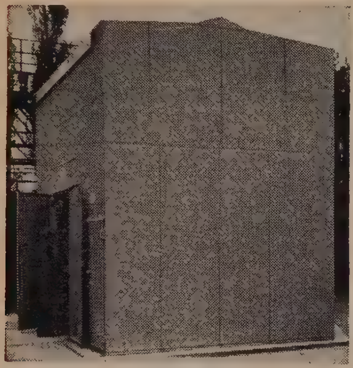
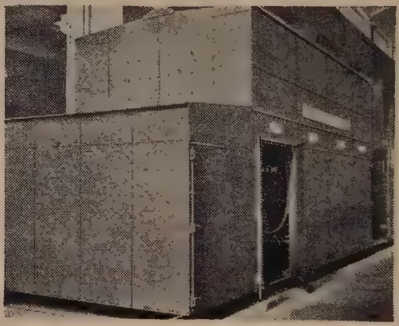


Eastern Electricity Board

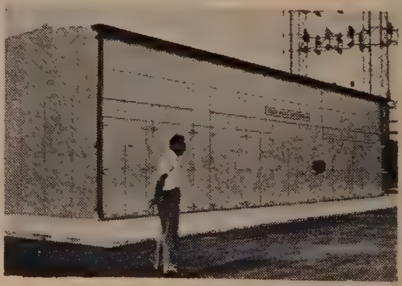


Hong Kong

Union of Soviet Socialist Republics

Southern Electricity Board

North Western Electricity Board



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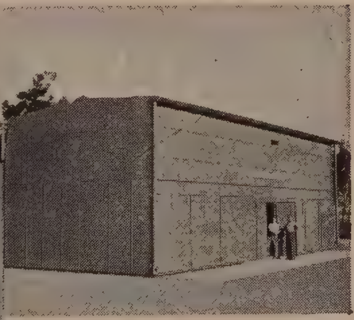
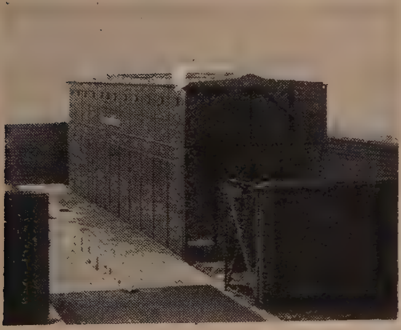


South Africa



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S.W.17

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CLEMENTS HOUSE, 14 GRESHAM STREET, LONDON, E.C.2. CRESCENT HOUSE, NEWCASTLE. LEAD WORKS LANE, CHESTER.

Export Enquiries to: Associated Lead Manufacturers Export Co. Ltd., Clements House, 14 Gresham Street, London. E.C.2

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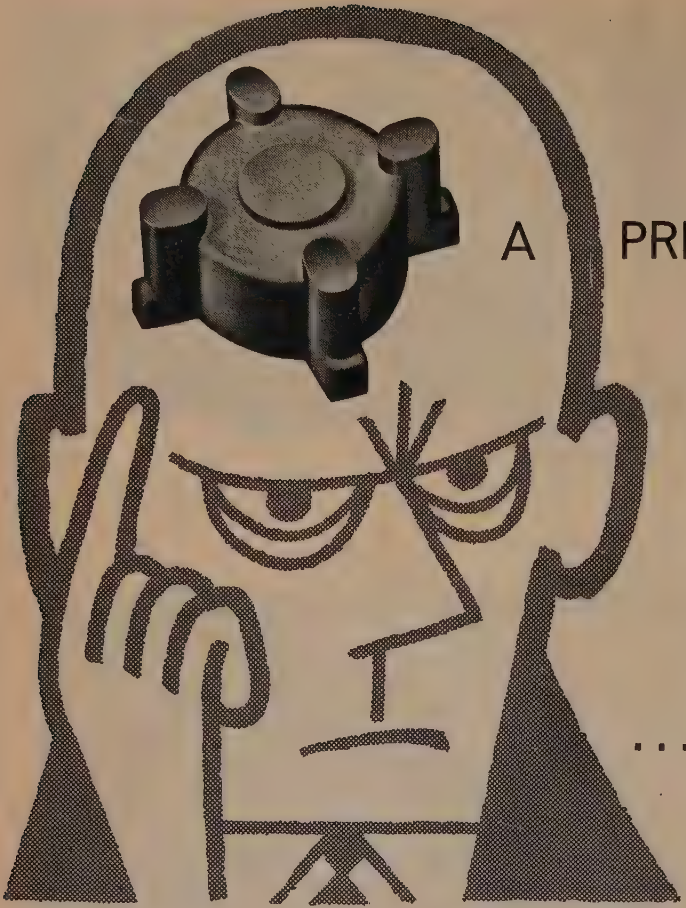

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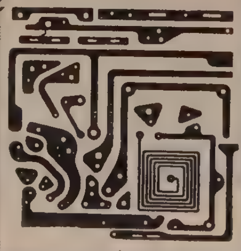

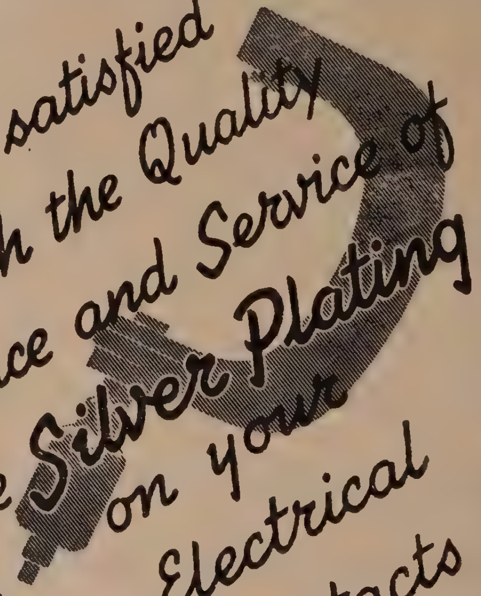

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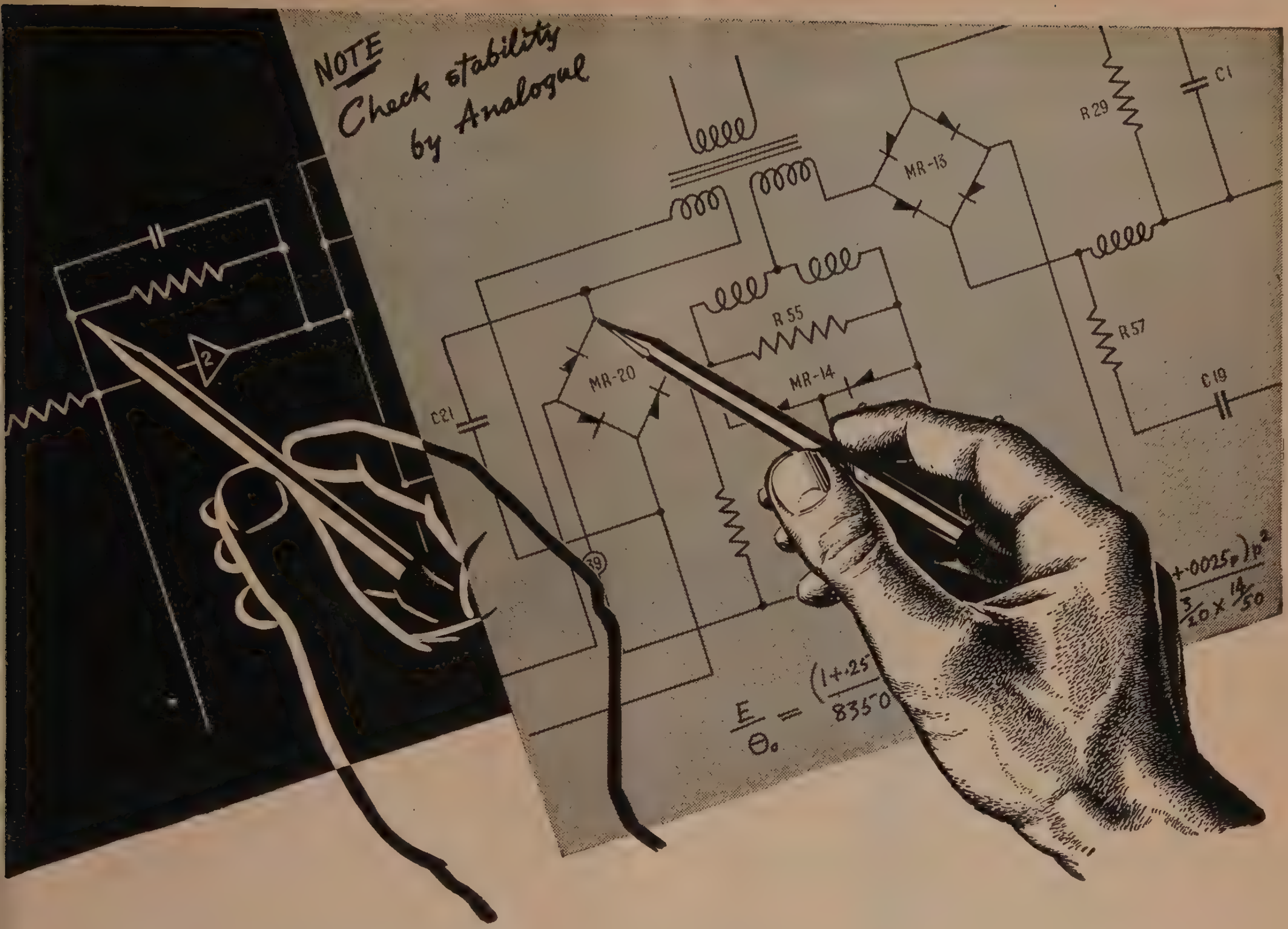

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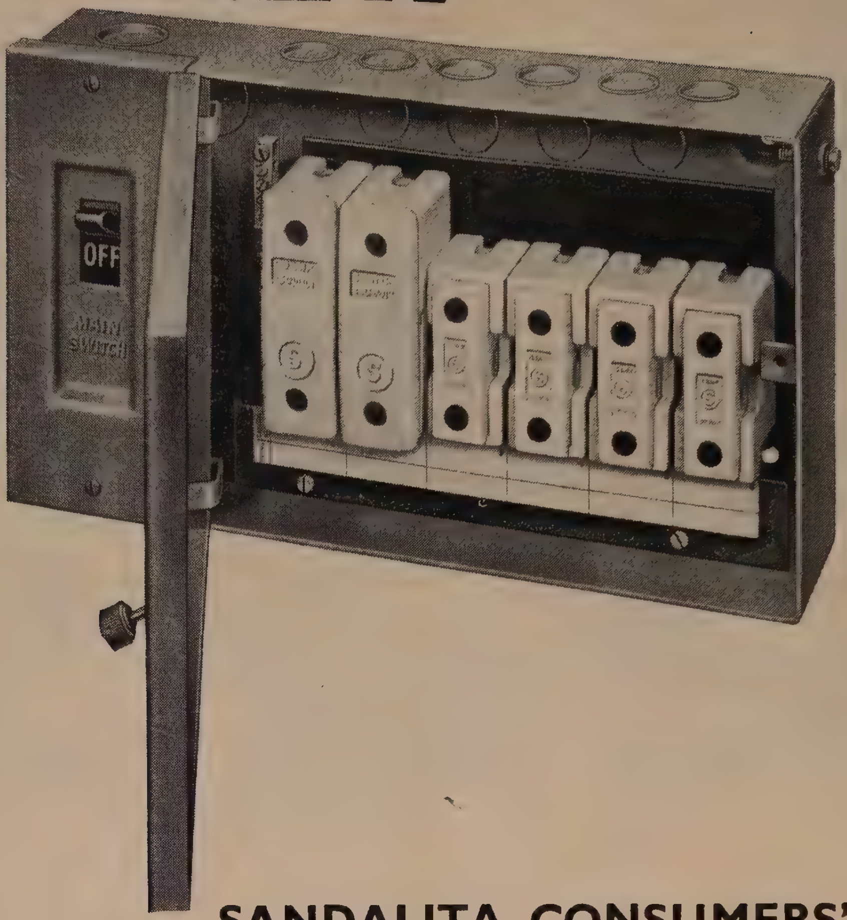

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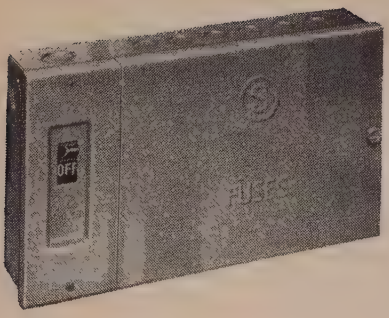

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(Continued on page 100)

(*Continued from page* 99)

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(*Continued on page* 101)

(Continued from page 100)

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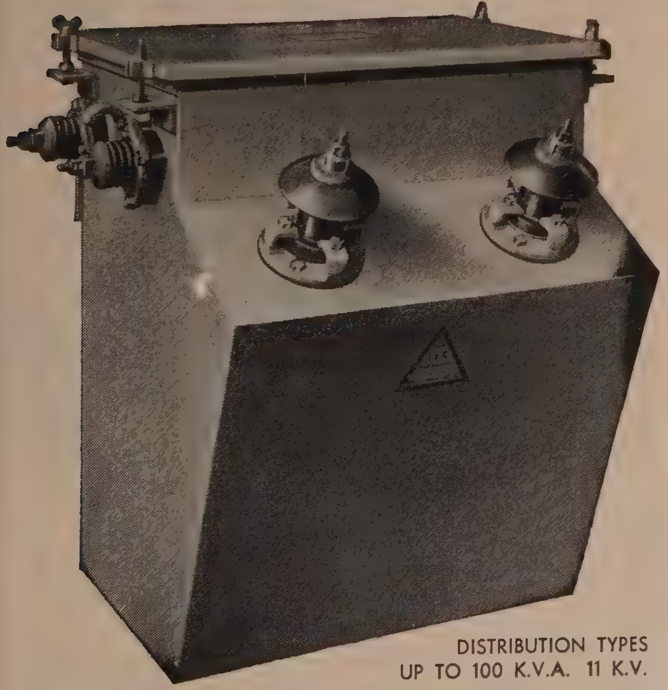

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HIGH-EFFICIENCY
Plus PROVED
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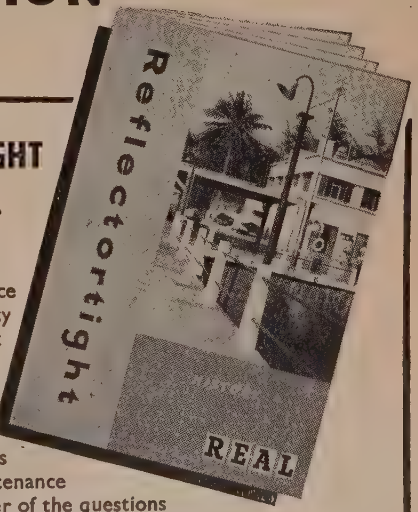

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A factual Progress Report of performance under truly heavy-duty conditions. This book details a variety of industries where the Reflectortight has been PROVED. It deals with problems of erection and maintenance and answers a number of the questions most usually asked by Engineers with experience (often bitter experience) of lighting in corrosive atmospheres.

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Equipment illustrated is typical of the multi-panel contactor boards, switchboards and supervisory control stations supplied to the orders of Messrs. Huntington, Heberlein & Co. Ltd., Moxey Ltd., and the Dalyte Electrical Co. Ltd. *Photographs by courtesy of The Stanton Ironworks Co. Ltd.*

Allen West Control Gear at STANTON

For that outstanding engineering achievement, the new Ore Preparation Plant of the Stanton Ironworks Company, Allen West & Co. Ltd. have been privileged to supply no fewer than seventeen composite switchboards. These embody the controls for over two hundred drives, ranging from ¼ to 200 H.P , in the Crushing, Screening and Sintering Sections of the 40-acre installation.

Robustness and reliability, allied to technical efficiency, are established features of Allen West products, which have been specially designed to withstand the most arduous conditions.

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FIFTY YEARS OF
CONTROL GEAR DEVELOPMENT

For every electric motor, whatever the application, there is an Allen West starter

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TENDERS are invited for the supply and installation of Class "B" Mercury Vapour Street Lighting in Roydfield Terrace, Rufford Avenue and South View Road, Yeadon; Larkfield Road and Batter Lane, Rawdon; and Netherfield Road, Guiseley. Approximate number of points, 72.

Separate tenders are invited as follows:—

(1) Supply and erection of columns and brackets and fitting and wiring of lanterns to columns, etc.

(2) Supply of lanterns and all auxiliary gear.

A firm may tender for both, but the Council reserve the right to accept separate tenders from different firms.

Copies of the plan, instructions to persons tendering, specifications, bills of quantities, forms of tender and schedule of rates and prices may be obtained from, and general conditions of contract seen at, the office of the Engineer and Surveyor to the Council at the address below, on payment of a deposit of two guineas, which will be returned on receipt of a bona fide tender or the return of the documents.

Tenders, enclosed in a plain sealed envelope, endorsed "Tender for Street Lighting," must be delivered to the undersigned not later than mid-day on Monday, the 13th June, 1960.

The Council does not bind itself to accept the lowest or any tender, and the acceptance of a tender or tenders will be subject to the obtaining by the Council of any requisite consents.

RALPH H. HULME,
Clerk of the Council.

Council Offices,
Micklefield House,
Rawdon, Leeds.
4400

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To Electrical Contractors

TENDERS are invited for Improvements to Existing Electrical Installation at one or more of the following schools:—

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2. Summerbee Junior School, East Way, Bournemouth.
3. Kinson Junior School, Kinson Road, Bournemouth.
4. East Howe Boys' and Girls' Secondary School, Hadow Road, Bournemouth.
5. Stourfield Mixed Secondary School, Beaufort Road, Bournemouth.

Specification and tender form obtainable from the Borough Architect's Office (Room 106), Town Hall, Bournemouth, on payment of two guineas deposit, to be refunded on receipt of a bona fide tender not subsequently withdrawn and the return of all documents provided. Tenders to be received by me not later than 10 a.m. 11th June, 1960.

A. LINDSAY CLEGG,
Town Clerk.
4420

COUNTY BOROUGH OF SOUTHEND-ON-SEA

Proposed Electrical Installation at St. Bernard's Convent High School for Girls

THE Council invite applications from Electrical Contractors to tender for the performance of works in connection with the proposed ELECTRICAL INSTALLATION to be carried out in M.I.C.C. cable at ST. BERNARD'S CONVENT HIGH SCHOOL FOR GIRLS.

Such applications must be received by the Borough Architect, 30, Alexandra Street, Southend-on-Sea, by 10 a.m. on Monday, 23rd May, 1960, together with details of similar works previously undertaken and names of architects or local authorities from whom references may be obtained. From such applications a selected list of tenders will be made, and those selected will be notified and will be required to make a payment of a deposit of £2.

After receipt of this deposit the drawings, specification and form of tender will be forwarded, and it is anticipated that these will be available in late May, 1960. The deposit of £2 will be refunded on receipt of a bona fide tender or the return of all loaned documents.

The Corporation do not bind themselves to accept the lowest or any tender.

ARCHIBALD GLEN,
Town Clerk. 4444

COUNTY BOROUGH OF GATESHEAD

Elgin 4 F.E. Mixed Secondary Technical School

APPLICATIONS are invited from contractors desirous of tendering for the ELECTRICAL INSTALLATION at the above new school.

Intending contractors should give evidence of having recently carried out contracts of similar size.

Work on this school is expected to start early in June, tender documents will be available at the beginning of June, and completed forms of tender will be returnable at the beginning of July.

A deposit of Three Pounds made payable to "The Borough Treasurer, Gateshead Corporation," and returnable on receipt of a bona fide tender and/or tender documents, should be forwarded to the Borough Surveyor, Swinburne Street, Gateshead, not later than Thursday, 19th May, 1960.

C. D. JACKSON,
Town Clerk.

Town Hall,
Gateshead.
2nd May, 1960.
4401

BOROUGH OF EALING

Street Lighting, Madeley Road and Queens Drive

CONTRACT "A": Supply of 41 140-watt Sodium Lanterns, complete with gear and lamps.

CONTRACT "B": Supply and erection of 41 25-ft. mounting height Steel Columns.

Details obtainable from the Borough Engineer, Town Hall, Ealing, London, W.5, on payment of £5 for each tender, returnable on receipt of a bona fide tender.

Tenders to the Town Clerk, Town Hall, Ealing, London, W.5, by noon 31st May, 1960.
4386

Advertisements are accepted up to **first post on Monday** of the week of issue

If displayed with boxed rules, name or symbol block by **Friday** prior to week of issue

All communications to be addressed to:
Classified Advertisement Department,
ELECTRICAL REVIEW
Dorset House, Stamford Street
London, S.E.1

Original testimonials should not be sent with applications for employment

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SHORTLAND COUNTY COUNCIL

Newcastle, New South Wales, Australia

Specification No. 7/1960

TENDERS FOR SUPPLY AND DELIVERY OF 4,700 FT. PAPER INSULATED LEAD COVERED SINGLE WIRE ARMOURED CABLE FOR WORKING PRESSURE OF 11,000 VOLTS, AND 2,100 FT. PAPER INSULATED LEAD COVERED SINGLE WIRE ARMOURED CABLE FOR 650 VOLTS WORKING PRESSURE

TENDERS are hereby invited from manufacturers in U.K. for the supply and delivery of the above-mentioned cable.

Copies of the specification may be obtained from Ranald J. Harvey & Partners, 34, Victoria Street, Westminster, London, S.W.1, on payment of 5s.

Tenders, endorsed "Contract S.C.C. 223," are to be sealed and delivered to the office of Ranald J. Harvey & Partners before noon on Thursday, 16th June, 1960. 4402

CITY OF WINCHESTER

Street Lighting: Alresford Road (A.31) and Bar End Road (C.461)

TENDERS are invited for the erection complete of approximately 50 Lighting Points involving 25-ft. Steel and 16-ft. Cast Iron Columns for 250-watt, 120-watt and 80-watt colour-corrected Mercury Lighting.

Specification, bill of quantities and form of tender may be obtained from the City Engineer and Surveyor, Guildhall, Winchester, at whose office plans may be inspected. A deposit of £2 2s. will be required but will be refunded on receipt of a bona fide tender.

Tenders in a plain envelope endorsed "Alresford Road Lighting" should be addressed to the undersigned and received not later than first post on Wednesday, 8th June, 1960.

R. H. McCALL,
Town Clerk.

Guildhall, Winchester.
3rd May, 1960.
4399

NOTTINGHAMSHIRE COUNTY COUNCIL

Highways Committee

Great North Road (A.1), Hawk's Nest to County Boundary: Street Lighting

TENDERS are invited for supplying and erecting 10 Steel Lamp Columns including lanterns and switchgear at Hawk's Nest, Bawtry.

Specification, bill of quantities and form of tender are obtainable from the County Surveyor, Shire Hall, Nottingham, and the plan can be inspected during ordinary office hours at the above address.

Completed tenders must be returned to the undersigned not later than first post on 3rd June, 1960.

A. R. DAVIS,
Clerk of the County Council.

County Hall,
West Bridgford, Nottingham.
4437

***Official Notices** (continued)*

COUNTY OF CORNWALL

Camborne Fire Station

APPLICATIONS are invited for FIXED PRICE TENDERS for the ELECTRICAL SERVICES Sub-Contract.

Applications should be made to the County Architect, County Hall, Truro, not later than Monday, 23rd May, 1960, and the closing date for receipt of tenders will be notified when the documents are despatched.

The lowest or any tender will not necessarily be accepted nor will the County Council pay to contractors any fees or expenses incurred in the preparation of tenders.

E. T. VERGER,
Clerk of the County Council.
County Hall, Truro.
5th May, 1960. 4442

BOROUGH OF KIDDERMINSTER

Street Lighting

TENDERS are invited for the erection and wiring of 1,000 Group "B" Concrete Lighting Columns.

Form of contract tender, specification and conditions of contract may be obtained from the Borough Engineer and Surveyor, 110 Mill Street, Kidderminster, on payment of a deposit of £2, which will be refunded on receipt of a bona fide tender not subsequently withdrawn.

Tenders must be delivered in the envelope provided not later than Monday, 30th May, 1960.

The Council does not bind itself to accept the lowest or any tender.

JOHN L. EVANS,
Town Hall, Town Clerk.
Kidderminster. 4443

INDIA STORE DEPARTMENT

THE Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of :—

Tender Ref. 20050/59/NEN/HAL.2.

ELECTRIC FURNACE, Conveyor Type. Aluminium Alloy W. billet heating, air circulation electric furnace, Conveyor length 20 feet, muffle size 7 feet 6 inches, 18 feet 6 inches by 2 feet 6 inches. Temperature max. 600° C.

The tender forms with schedules and specifications, which are returnable on Thursday, 9th June, 1960, may be obtained from the Office (C.D.N. Branch) on payment of a fee of 10s. (not refundable) for each tender.

The applications for tenders should clearly state the reference number. 4382

BOROUGH OF WANSTEAD AND WOODFORD

District Road Lighting (Groups "A" and "B")

TENDERS are invited for the installation of approximately 685 Lighting Units of various types in 120 roads in the Borough.

Tender documents may be obtained from the Borough Engineer, Municipal Offices, Woodford, London, E.18, upon payment of a deposit of £5, and drawings may be inspected at this address during normal working hours (Saturdays excluded).

Tenders in envelopes provided by the Council to be delivered by noon on the 31st May, 1960. 4436

SITUATIONS VACANT

See "Replies to Box Numbers" on page 103)

SURREY EDUCATION COMMITTEE

Wimbledon Technical College
Gladstone Road, Wimbledon, London, S.W.19

APPLICATIONS are invited for the post of HEAD of the ELECTRICAL ENGINEERING DEPARTMENT (Grade III). Candidates should have had good industrial and teaching experience; previous experience as head of department or in supervisory capacity an advantage. Salary Burnham Scale, £1,800 × £50 to £1,950 plus London allowance.

Particulars of post and application form obtainable from Principal, to be returned by 10th June. 4361

ELECTRONIC COMPONENTS

A **TECHNICIAN** is required by **ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL,** for the specification and standardisation of ranges of electronic components involving the following duties :—

1. Advise the Contracts Section on all technical aspects of these components, including supply sources.
2. Advise the Stores on storage problems.
3. Answer users' enquiries.
4. Draft illustrated components catalogues.
5. Serve on standardisation sub-committees of the R.C.S.C.

Applicants should have served a recognised electrical engineering apprenticeship or have had equivalent electronics training. Familiarity with R.C.S.C., M.O.D. and B.S.I. documents and standardisation techniques essential. A National Certificate an advantage.

SALARY £925 (at age 30 or over) to £1,105 p.a.

Housing and contributory pension schemes.

Send POSTCARD for details to the Group Recruitment Officer (1664/48), U.K.A.E.A., A.E.R.E., Harwell, Didcot, Berks.

4384

SOUTH EASTERN ELECTRICITY BOARD

JOINTER,
Herne Bay/Canterbury District.

Wages 4s. 11½d. per hour for a 42-hour, 5-day week under N.J.I.C. Agreement.

Applications quoting ER and naming two referees to Joint District Manager, SEEBOARD, 65, Mortimer Street, Herne Bay, by 23rd May, 1960.

ENGINEERING DRAUGHTSMAN,
Croydon and West Kent Headquarters.

Salary £660-£780 p.a., including London allowance, under N.J.B. Schedule D, Grade 6. Superannuable. Applicants must be good draughtsmen with a sound general education and adequate engineering knowledge, preferably with experience in the layout of substations and switchgear, cable records and site plans.

Applications quoting ER and naming two referees to Croydon and West Kent Manager, SEEBOARD, Wellesley Road, Croydon, by 25th May, 1960.

SHOWROOM ASSISTANT (Male),
Crawley and Horsham District.

Annual salary subject to age, qualifications and experience up to Grade 1, National Joint Council, Schedule of Salaries and Conditions of Employment, at present a maximum of £625 per annum. Duties will include general showroom work, advising consumers on the use of electrical apparatus. The appointment will be made at Horsham Showroom, but the successful applicant may be required to work at times in the Crawley Showroom. He may also be required to carry out relief Cashier duties.

Applications quoting ER and naming two referees to District Manager, SEEBOARD, 50-52, The Broadway, Crawley, by 23rd May, 1960.

ASSISTANT ENGINEER
(Operation and Maintenance),
Kent Sub-Area Headquarters.

Salary £1,270 × £30 to £1,360. N.J.B. Class L, Grade 7. Superannuable. Candidates should preferably be Corporate Members of the Institution of Electrical Engineers and have a wire experience in the commissioning of substations, fault locating and the operation and maintenance of overhead and underground distribution systems, switchgear and transformers up to 33 kV.

Applications quoting ER and naming two referees to the Kent Area Manager, SEEBOARD, 178/184, High Street, Rochester, by 25th May, 1960.

COMMERCIAL ASSISTANT,
Tunbridge Wells District, centred on East Grinstead.

Annual salary £640-£700 under N.J.C. Grade 2. Applicants should have a good knowledge of electrical equipment and tariffs and will be required to meet consumers in connection with the sale and installation of appliances.

Applications quoting ER and naming two referees to District Manager, SEEBOARD, Town Hall, Tunbridge Wells, by 25th May, 1960.

SENIOR DRAUGHTSMAN (Engineering),
Engineer-in-Chief's Dept., Headquarters.

Salary £930 × £20 to £1,030 under N.J.B. Schedule D, Grade 4. Superannuable. Applicants of good general education supported by adequate technical knowledge in electrical or mechanical engineering, must be competent draughtsmen and should have had experience in the layout and constructional details of large indoor and outdoor substations up to 33 kV with associated cable works and overhead lines. Works experience with a manufacturer of heavy electrical equipment is desirable.

Applications quoting ER and naming two referees on forms from the Engineer-in-Chief, SEEBOARD, 10, Queen's Gardens, Hove 3, Sussex, by 25th May, 1960.

GEORGE WRAY,
Secretary.
4452

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Project Group

Second Assistant Engineer: Programmes

APPLICATIONS are invited for the appointment of SECOND ASSISTANT ENGINEER in the Programmes Department of the Midlands Project Group.

The selected candidate will be required to assist in the preparation of detailed programme charts for complete power station projects including contract procedure, manufacture, site construction and commissioning.

Candidates should preferably possess Higher National Certificates or equivalent in either mechanical or electrical engineering and have served a recognised engineering apprenticeship. Experience in the construction of heavy plant as installed in modern power stations, either in a manufacturer's works or on site, is essential, and a knowledge of civil engineering works involved would be an advantage.

The salary will be in accordance with Schedule C, Grade 4, £1,195-£1,545 per annum of the National Joint Board Agreement.

Applications should be made on standard form AE6, available from the Administrative Officer, Midlands Project Group, P.O. Box 314, 341, Bournville Lane, Birmingham, and should be returned to him not later than 19th May, 1960.

Envelopes should be marked "Confidential" Staff Vacancy No. MPG.27/60. 4424

ROAN ANTELOPE COPPER MINES LIMITED

NORTHERN RHODESIA

invites applications for the appointment of

ELECTRICAL ENGINEER

This is a senior appointment and entails full responsibility to the Company's Resident Engineer for all electrical engineering matters.

The Company's activities are extensive, consisting of the mining and milling of approximately 6 million tons of ore per year and a smelter production of approximately 90 thousand tons of copper per year. The company also operates certain ancillaries including two townships and two hospitals for European and African employees. Power consumption is over 220 million units per year, with a peak load of 34 thousand kW and is supplied partly from the Company's own thermal generating station and partly from the Copperbelt 66 kV grid system which is fed from the Kariba Hydro-Electric Scheme.

The initial basic salary which will be in excess of £2,000 per annum will be commensurate with qualifications and experience. In addition to basic salary there is a cost-of-living currently £6.10.0 per month. There is also a variable bonus which, at the present time, is 39 per cent of basic salary. The successful candidate will be required to join the Company's Pension and Life Assurance Scheme. Employees contribute 5 per cent of basic earnings, and the Company contributes 5 per cent for the first year increasing its contribution by ½ per cent for each completed year of service. There is also a contributory Medical Benefit Scheme.

Leave at the rate of 55 days per annum may be accumulated over a period of 3 years. Passage fares to Northern Rhodesia will be paid for the employee and his family.

Accommodation in a large three-bedroomed house is available on engagement at a sub-economic rental.

Applicants who should have a degree or equivalent qualification in Electrical Engineering, be Corporate Members of the Institution of Electrical Engineers, and also have had previous experience in heavy engineering and labour relations should send particulars of age, qualifications and experience, in confidence, to:—

D. J. Beake, Selection Trust Building
Mason's Avenue, Coleman Street, London, E.C.2

4276

CITY OF BIRMINGHAM PUBLIC WORKS DEPARTMENT

Mechanical and Public Lighting Section

APPLICATIONS are invited for the post of PRINCIPAL ASSISTANT ENGINEER (Mechanical, Heating and Ventilation).

Salary in accordance with salary scales for senior officers, Grade B, £1,305/£1,485 per annum.

Applicants must be Associate Members of the Institution of Mechanical, Electrical or Heating and Ventilating Engineers or hold the Higher National Certifictae in Mechanical or Electrical Engineering (with five years' experience).

The duties of the post include the design of mechanical and heating services and installations in civic buildings, municipal offices, multi-storey flats, car parking garages, fire and police stations, schools, baths, salvage destructor plants, pump stations, etc.

Candidates must have had experience in the design, specification and supervision of contracts associated with the above work and be experienced in the supervision and control of staff.

The appointment is permanent, superannuable and subject to a medical examination.

Applications endorsed " Principal Assistant Engineer," stating qualifications, age and experience, together with the names of two referees, should reach the undersigned not later than the 28th May, 1960.

Canvassing disqualifies.

HERBERT J. MANZONI,
Civic Centre, City Engineer and Surveyor.
Birmingham, 1.
2nd May, 1960. 4388

ELECTRICAL WHOLESALERS (E.W.F.)

SALES REPRESENTATIVE in the Luton and Luton areas. Must have established connections with industrial users and first-class contractors and retailers. We have special offers available to experienced applicants who really understand the sales side of the industry. Brief particulars in confidence to Young & Wildsmith Ltd., 35, Little Russell Street, London, W.C.1. 4392

ASSISTANT INSPECTORS AND INSPECTORS OF WORKS (ELECTRICAL)

required by UGANDA GOVERNMENT PUBLIC WORKS DEPARTMENT on contract for one tour of 30-36 months in first instance. Salary according to age and experience in scale (including inducement pay) £945 rising to £1,341 a year. Gratuity at rate 13½% of total salary drawn. Outfit allowance £30. Free passages and liberal leave on full salary.

Candidates should be between 29-40 years and must possess O.N.C. (Electrical) or equivalent. They should have served full apprenticeship and at least five years' subsequent experience in maintenance of industrial electrical equipment, machinery and large electrical installations. They must be fully conversant with U.K. Home Office Electricity Rules, Electricity Regulations under the Factories Act and those of the Electrical Commissioners. They should have had experience in organising works programmes and in controlling subordinate staff, materials and funds. Experience with large electrical contracting firms and/or Government works an advantage.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, qualifications and experience, and quote M2A/50272/EF. 4387

ELECTRICAL ENGINEER

A QUALIFIED engineer required to undertake the planning of electrification schemes associated with Air Separation Plants. Should be conversant with specifications of high - tension switchgear and large machinery, etc., and be well versed in the technical supervision of contracted work. Must be prepared to travel within the U.K. and spend periods on site.

Apply :—
Personnel Manager
AIR PRODUCTS (G.B.) LTD.
49/50, Poland Street, London, W.1

4398

METROPOLITAN BOROUGH OF CAMBERWELL

Assistant Engineer (Electrical)

APPLICATIONS invited for this appointment within salary range of £1,095-£1,405 (Grades A.P.T. IV or V of the National Scales) for street lighting modernisation and maintenance. Grade and commencing salary according to qualifications and experience.

The Council is carrying out a large programme of Group "A" and "B" modernisation and proposes to take over the maintenance of street lighting during the next twelve months.

Applicants should be suitably qualified (preferably Corporate Members of the Institution of Electrical Engineers) and have wide experience in the design and installation of street lighting schemes, together with a sound knowledge of the maintenance of equipment.

Application forms from Town Clerk, Town Hall, London, S.E.5. Closing date 28th May, 1960. 4370

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

APPLICATIONS are invited for the position of FOURTH ASSISTANT ENGINEER in the Testing Section of the Department of the Chief Generation Engineer (Operation). This is a superannuable appointment under N.J.B. service conditions, commencing salary within Grade 8 of Schedule B of the Agreement covering the range £735 - £860 per annum, ultimately rising to £960 per annum.

Applicants should possess suitable engineering qualifications, and should have some experience of testing power station plant.

Apply quoting Vacancy No. 91/60MD, on forms AE6, which are available from the Divisional Testing Engineer, Nechells "A" Power Station, off Aston Church Road, Nechells, Birmingham, 7, to whom they should be returned when completed not later than 30th May, 1960. 4403

***Situations Vacant** (continued)*

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

SUB-AREA HEADQUARTERS

(1) THIRD ASSISTANT ENGINEER
(Civil Engineering Construction)
(103/60.N).
(2) THIRD ASSISTANT ENGINEER
(Electrical Engineering Construction)
(104/60.N).
(3) FOURTH ASSISTANT ENGINEER
(Electrical Engineering Construction)
(105/60.N).

Candidates for (1) should have had experience in the preparation of quantities, estimates and specifications and also in the supervision of construction and maintenance by direct or contract labour of buildings and civil engineering works including substations, offices, service centres, stores and workshops, etc.

Candidates for (2) and (3) should have had experience in the construction of substations, the erection of overhead lines and the laying and jointing of underground cables at voltages up to 33 kV.

Salary for (1) and (2): N.J.B. Class L, Grade 10, £1,025-£1,085.

Salary for (3): N.J.B. Class L, Grade 13, £860-£905.

Apply by letter, stating position applied for, to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend Street, Bedford, by 27th May, 1960.

BEDFORD DISTRICT

THREE THIRD ASSISTANT ENGINEERS (106/60.N).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems including substations.

Salary N.J.B. Class F, Grade 9 (£815-£860).

It is expected that this District will be reclassified G from 1st April, 1960, in which case the salary will be £860-£905.

Apply by letter to the Manager, Bedford District, Eastern Electricity Board, Prebend Street, Bedford, by 27th May, 1960.

WATFORD DISTRICT

THIRD ASSISTANT ENGINEER (107/60.R).

Candidates should have had a sound technical training and be experienced in the construction, operation and maintenance of H.V. and L.V. underground systems including substations and switchgear. Knowledge of overhead lines would be an advantage.

Salary N.J.B. Class G, Grade 9 (£860-£905) plus London allowance.

Apply by letter to the Manager, Watford District, Eastern Electricity Board, The Parade, High Street, Watford, by 27th May, 1960.

Northmet Sub-Area

SUB-AREA HEADQUARTERS

TWO FOURTH ASSISTANT ENGINEERS (Development Section)
(Ref. 960) (108/60.N).

Candidates should possess the Higher National Certificate in Electrical Engineering or an equivalent qualification, and should have had some experience of the construction, operation and maintenance of distribution equipment.

The duties will include the preparation and technical assessment of reinforcement and development schemes for the Sub-Area H.V. and L.V. systems, assistance with the capital programme, the examination of load flow diagrams and estimation of future trends, and the preparation of schemes for long-term reinforcement.

Salary N.J.B. Grade 13 (£965-£1,025) plus London allowance.

ENGINEERING DRAUGHTSMAN,
Substations Drawing Office
(Ref. 956) (109/60.R).

Candidates should have had a good technical training and experience in the layout of switchgear, transformers and associated equipment for outdoor and indoor type substations up to 33 kV.

Salary N.J.B. Schedule D, Grade 6 (£620-£740) plus London allowance.

TWO WAYLEAVE ASSISTANTS
(Development Section)
(Ref. 961) (110/60.N).

Candidates should have had a good education and be experienced in negotiations with owners of properties for the acquisition of substation sites and the obtaining of wayleaves.

Ability to assess and deal with agricultural and other damage claims is desirable.

Salary N.J.C. 3 (£720-£780) plus London allowance.

For the above appointments apply by letter to the Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet House, Southgate, London, N.14, by 23rd May, 1960.

HERTFORD DISTRICT

GENERAL ASSISTANT ENGINEER
(Ref. 962) (113/60.R).

Candidates should have had a good general and technical education and possess the Higher National Certificate or an equivalent qualification.

Salary N.J.B. Class G, Grade 12 (£710-£755).

Apply by letter to W. H. Hatton-Ward, Assoc.I.E.E., A.M.B.I.M., Manager, Eastern Electricity Board, Bridgefoot, Ware, Herts., by 23rd May, 1960.

FOURTH ASSISTANT ENGINEERS
(1) ST. ALBANS DISTRICT
(Ref. 963) (111/60.N).
(2) ENFIELD DISTRICT (Two Posts)
(Ref. 959) (112/60.N).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems including substations.

Salary N.J.B. Class G, Grade 11 (£765-£810) plus London allowance for Post (2).

Apply by letter, by 23rd May, 1960, as follows:—

(1) F. J. Drake, Assoc. I.E.E., Manager, Eastern Electricity Board, 107, St. Peter's Street, St. Albans, Herts.
(2) A. T. Durbridge, Manager, Eastern Electricity Board, 40, Church Street, Enfield.

4460

NUCLEAR POWER STATION

COMMISSIONING ENGINEER

A COMPANY engaged in the design, construction and commissioning of nuclear power stations has a vacancy for a SHIFT COMMISSIONING ENGINEER in its Commissioning Department.

The successful candidate, who will be trained in the operation of nuclear power stations, must have some experience as a Shift Charge Engineer in a conventional power station. He should either be an Associate Member of a major professional Institution or hold qualifications leading to Associate Membership.

Applications should be addressed to Box 4426, and give details of age, qualifications, experience and current salary.

ELECTRICAL DRAUGHTSMAN

Westminster area. Professional firm dealing with large-scale industrial installations, design processes and mechanical handling. On the electrical side general draughting ability and H.N.C. educational standard.

Please indicate age, education and experience to—Box 4409.

CITY OF LEICESTER EDUCATION COMMITTEE

Leicester College of Technology and Commerce

Principal: R. E. Wood, M.Sc., F.Inst.P.

APPLICATIONS are invited for the post of ASSISTANT (GRADE B) in the Department of Electrical Engineering, for Ordinary National Certificate and City and Guilds of London Institute Electrical Installation and Electrical Fitters courses. Candidates should possess a Higher National Certificate in Electrical Engineering, or appropriate Final City and Guilds Certificates, with suitable industrial experience and, preferably, some teaching experience.

Salary: Burnham Technical Scale, £700 to £1,150 per annum with appropriate allowances for approved qualifications, industrial and/or teaching experience.

Form of application and further particulars can be obtained from the Registrar, College of Technology and Commerce, Leicester, to whom completed forms should be returned as soon as possible. 4462

BIRMINGHAM REGIONAL HOSPITAL BOARD

THE Board requires Engineers in the following grades:—

(a) PRINCIPAL ASSISTANT ENGINEER
(£1,665 to £2,035 per annum).
(b) GENERAL GRADE ENGINEER
(£910 to £1,600 per annum).
(c) ENGINEERING ASSISTANT
(£600 to £1,070 per annum).
(d) ENGINEERING DRAUGHTSMAN
(£550 to £1,250 per annum).

Interesting and responsible work in Regional Engineer's Department on design and installation of mechanical and electrical services for new hospitals and alterations to existing. Previous hospital experience desirable but not essential. Corporate Membership of Chartered Engineering Institution essential for Principal Assistant grade.

Applications, giving three referees, to Secretary, 10, Augustus Road, Edgbaston, Birmingham, 15, by 3rd June, 1960, from whom further details can be obtained. 4463

WANTED IN LANCASHIRE

ENGINEER - REPRESENTATIVE with good general engineering knowledge, especially electrical plant and pumps. Write stating qualifications and experience to:—

THOMAS MITCHELL & SONS LTD.
Bolton

4466

SIEMENS

have a vacancy for an

ELECTRICAL ENGINEER

FOR GERMAN - ENGLISH TRANSLATIONS

APPLICATIONS are invited from British-trained engineers with a good general education and sound technical training, preferably also with practical experience in the application of electric equipment. Good working knowledge of German is essential. The ability to write clearly and concisely will be expected of candidates.

A five-day week is worked, with generous holidays. Favourable housing conditions for permanent staff.

Apply, stating age, education, qualifications, experience and salary required to :—

SIEMENS - SCHUCKERTWERKE AKTIENGESELLSCHAFT
Personalabteilung, Erlangen, Werner-von-Siemens-Strasse 50
Germany

245

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area
COMMERCIAL DEPARTMENT

Applications are invited from suitable applicants who are interested in a Commercial Engineering career in a Sub-Area which has a wide diversity of load ranging from very heavy industry to mixed domestic, and which offers commensurate experience. Sheffield lies on the edge of the Peak National Park and has attractive residential areas.

1. SECOND ASSISTANT ENGINEER (Assistant Commercial Officer).
   N.J.B. Class M, Grade 7, £1,360/£30/£1,450 per annum.

Applicants should be Corporate Members of the Institution of Electrical Engineers or possess an equivalent qualification. They must have had experience necessary to enable them to supervise and organise the work of one of two Sections of the Sheffield District Commercial Department, each of which carry out all Commercial duties.

2. ASSISTANT ENGINEER (Consumers).
   N.J.B. Class L, Grade 11, £965/£20/£1,025 per annum.

Applicants should preferably hold a qualification leading to Corporate Membership of the Institution of Electrical Engineers and should have had experience in space heating, commercial catering, refrigeration and rural development.

3. ASSISTANT ENGINEERS (Consumers) (Two Posts).
   N.J.B. Class L, Grade 13, £860/£15/£905 per annum.

Applicants should possess a Higher National Certificate in Electrical Engineering or equivalent qualification. Experience of negotiating with consumers requiring medium voltage supplies and knowledge of the wiring rules and regulations of the I.E.E. will be an advantage.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 27th May, 1960.

No. 2 (Huddersfield) Sub-Area
HALIFAX DISTRICT
ASSISTANT CONSUMERS' ENGINEER.

Applicants should have had a sound technical and practical training, together with experience in the work of a District Commercial Department, viz. negotiations with consumers for supply, installation inspection and metering, tariffs and advice to consumers on the use of electricity for domestic and non-domestic purposes. The successful candidate will be located at the Cleckheaton Local Offices.

Salary N.J.B. Class J, Grade 12, £815/£15/£860 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, not later than 27th May, 1960.

4447

GHANA CIVIL SERVICE

VACANCIES exist for ENGINEERS/ASSISTANT ENGINEERS, POSTS AND TELECOMMUNICATIONS DEPARTMENT. Duties: Chargeship of a Telecommunication Engineering District or Assistant to an Engineer in charge of such a District. Responsibility for the installation and satisfactory maintenance by subordinate staff of overhead and underground telegraph and telephone lines; telegraph apparatus including teleprinters; automatic and manual telephone exchanges; carrier telephone apparatus and V.H.F. telegraph; railway block signalling and control apparatus; transport; small petrol and diesel engine generators.

Qualifications: A university degree in electrical engineering plus at least two years' practical postgraduate experience in electrical engineering.

Salary in range £1,180-£2,080 per annum. Entry point in scale depends on age and experience.

Appointments are on contract terms for two tours each of 15-18 months. Gratuity £150 p.a. Free passages for officer, wife and up to 3 children under 18 years, and in addition an education allowance for children when not resident in Ghana and attending full-time school of £100 a child for up to 3 children under 18 years. Accommodation at low rental. Interest-free advance for car and car maintenance allowance may be granted. Generous leave on full pay. Income tax at low local rates.

For further particulars and application forms please send POSTCARD to the Director of Recruitment, Ghana High Commission, 248/50, Tottenham Court Road, London, W.1. 4428

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. appointments:—

USKMOUTH "B" POWER STATION
Near NEWPORT, MON.

DEPUTY STATION SUPERINTENDENT
(Vacancy No. 119/ER/60).

Salary K.2 (£1,725-£1,830 per annum).

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers, and have had considerable experience in the operation, maintenance and administration of a modern power station.

OPERATION SUPERINTENDENT
(Vacancy No. 120/ER/60).

Salary K.4 (£1,470-£1,575 per annum).

Applicants should have had wide experience of plant operation, testing and special investigations. An Engineering Degree and/or Corporate Membership of the Institution of Mechanical or Electrical Engineers desirable.

MAINTENANCE ENGINEER (Mechanical).
(Vacancy No. 121/ER/60).

MAINTENANCE ENGINEER (Electrical).
(Vacancy No. 122/ER/60).

Salary K.5 (£1,360-£1,450 per annum).

Applicants should have had experience of power station maintenance and should preferably be Corporate Members of the Institution of Mechanical/Electrical Engineers.

UPPER BOAT POWER STATION
PONTYPRIDD, GLAM.

SHIFT CHARGE ENGINEER
(Vacancy No. 123/ER/60).

Salary H.7 (£1,025-£1,085 per annum), plus 10% shift enhancement.

Applicants should possess Higher National Certificate or equivalent, and should have had operating experience in a power station.

TECHNICAL DEPARTMENT
(West Group), SWANSEA

FOURTH ASSISTANT ENGINEER
(Vacancy No. 124/ER/60).

Salary AX/DX7 (£840-£1,040 per annum) or AX/DX8 (£735-£935 per annum) according to experience.

Candidates should possess an Electrical Engineering Degree, or the Higher National Certificate and have served an engineering apprenticeship. Experience, preferably in a large electrical manufacturing firm, or in the electricity supply industry.

Successful applicant will be employed on interesting problems in power stations and on the 132-kV and 275-kV grid.

The West Group office is at present located at Swansea, but will be moving to Carmarthen, probably early in 1961.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 27th May, 1960. 4459

AEI

ASSOCIATED ELECTRICAL INDUSTRIES LIMITED

APPLICATIONS are invited for appointments as SALES ENGINEERS at the Willesden, London, factory of the A.E.I. Switchgear Division.

The work, involving the preparation of tenders and the handling of contracts for a wide range of heavy switchgear, is interesting and calls for commonsense and initiative.

Good salaries are available to men preferably between 25 and 45 years of age.

The desired qualification is an engineering degree, but men qualified in electrical engineering to at least H.N.C. standard will be considered.

Applications should be addressed to :—

Mr. P. E. Gaze, Sales Manager
Switchgear Sales Department
ASSOCIATED ELECTRICAL INDUSTRIES LTD.
Neasden Lane, Willesden, London, N.W.10

4417

H. CLARKE & COMPANY (Manchester) LIMITED

ELECTRICAL INSULATION MANUFACTURERS

SALES REPRESENTATIVE

required for Scotland.

The position is permanent and offers excellent opportunities for an enthusiastic man.

Knowledge of the electrical insulation industry and materials desirable although not essential.

All applications, which will be treated in strictest confidence, should give full particulars of previous experience, and should be addressed to:—

The Sales Manager
Atlas Works, Patricroft, Manchester

4411

Situations Vacant *(continued)*

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

FOURTH ASSISTANT ENGINEER
TRANSMISSION DEPARTMENT
DIVISIONAL HEADQUARTERS
(Vacancy No. 99/60)

Experience in maintenance and operation of 132 kV transmission lines and substations essential.

Candidates should preferably have qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

The salary will be in accordance with Class AX/EX, Grade 7 (£840-£1,065 per annum) of Schedule B of the National Joint Board agreement.

Closing date for receipt of applications, 20th May, 1960.

ASSISTANT RESIDENT ENGINEER
TRANSMISSION DEPARTMENT
DIVISIONAL HEADQUARTERS
(Vacancy No. 102/60)

Applications are invited for the post of Assistant Resident Engineer for headquarters schemes within the division.

Candidates should have had experience in all phases of construction of transmission lines having steel towers and S.C.A. conductors, and have a knowledge of their design. They should preferably possess H.N.C. electrical or mechanical qualifications.

The salary will be in accordance with Class AX/EX, Grade 6 (£925-£1,170 per annum) of Schedule B of the National Joint Board agreement.

Closing date for receipt of applications, 20th May, 1960.

THIRD ASSISTANT ENGINEER
(System Planning)
TECHNICAL DEPARTMENT
DIVISIONAL HEADQUARTERS
(Vacancy No. 109/60)

Applicants should preferably hold an Electrical Engineering Degree or have attained the Higher National Certificate standard in Electrical Engineering. Preference will be given to candidates who have experience of fault calculations and of switchgear and protective gear systems.

Duties will include power system calculations, relay settings, preparation system diagrams and operation of D.C. and A.C. calculators.

The salary will be in accordance with Class AX/EX, Grade 6 (£925-£1,170 per annum) of Schedule B of the National Joint Board agreement.

Closing date for receipt of applications, 27th May, 1960.

FIRST ASSISTANT STATION CHEMIST
HIGH MARNHAM POWER STATION
(Vacancy No. 110/60)

Previous experience in a power station laboratory is essential and candidates should preferably be Associates of the Royal Institute of Chemistry or hold an equivalent qualification. Candidates must be familiar with the methods of sampling and analysis of coal, oil and water and with the interpretation and application of the analytical results. Experience with the problems arising from high pressure, high temperature operation and of the solution of such problems is desirable.

Salary will be in accordance with Class M, Grade 8 (£1,270-£1,360 per annum) of the National Joint Board agreement.

Closing date for receipt of applications, 20th May, 1960.

PLANT SHIFT CONTROL ENGINEER
DRAKELOW A POWER STATION
(Vacancy No. 117/60)

Experience desirable in control of boilers and turbines at high pressure and temperature, pulverised fuel, together with electrical control room experience. Technical qualifications to Higher National Standard desirable.

Salary will be in acordance with Class J, Grade 10 (£910-£955 per annum) of the National Joint Board agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 27th May, 1960.

ASSISTANT ENGINEER (Instruments)
HIGH MARNHAM POWER STATION
(Vacancy No. 111/60)

Applicants should possess a sound technical training and have practical experience of modern power station instrumentation and automatic control. Experience of electronic equipment will be a distinct advantage.

The salary will be in accordance with Class M, Grade 10 (£1,095-£1,170 per annum) of the National Joint Board agreement.

Closing date for receipt of applications, 27th May, 1960.

GENERAL ASSISTANT ENGINEERS
HIGH MARNHAM POWER STATION
(Vacancy No. 112/60)

Applicants should hold the Ordinary National Certificate in Mechanical or Electrical Engineering. There are good opportunities for keen engineers who are willing to study new plant and methods.

The salary during the initial training period will depend upon qualifications and knowledge and will be within the range £560-£700 per annum of the National Joint Board agreement.

Closing date for receipt of applications, 27th May, 1960.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated.

O. S. WOODS,
Divisional Controller.

5th May, 1960. 4458

ISLE OF WIGHT COUNTY COUNCIL

Isle of Wight Technical College

APPLICATIONS are invited for the full-time appointment of GRADE "B" TEACHER of Electrical Engineering in the Department of Engineering. The teacher appointed will be required to teach electrical subjects for National Certificate and City and Guilds courses.

Qualifications should include Corporate Membership of the Institution of Electrical Engineers and good industrial experience.

Salary will be in accordance with Grade B of the Burnham scale.

Further particulars and forms of application (stamped addressed envelope) may be obtained from the Registrar, Isle of Wight Technical College, Hunnyhill, Newport, Isle of Wight, to whom they should be returned within two weeks of the appearance of this advertisement.

A. L. HUTCHINSON,
County Education Officer.

4440

ESTIMATOR
ELECTRICAL CONTRACTING

ESTABLISHED and progressive firm requires experienced Estimator for industrial, commercial and public authority contracts. Pension scheme.

Full details in strict confidence to:—

Contracts Director
SERVICE ELECTRIC CO. LTD.
Honeypot Lane, Stanmore, Middx.

4310

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

Littlebrook Power Station

ASSISTANT ENGINEER (Efficiency) (Vacancy No. 105/60). Candidates should possess at least H.N.C. or equivalent qualification and practical experience in generating station work would be an advantage. The successful candidate will be required to assist the Station Efficiency Engineer in investigating the thermal performance of the plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary N.J.B. Class L, Grade 14, £865-£910 per annum, including London allowance.

Applications giving age, details of experience, present position, etc., and quoting vacancy number, to Station Superintendent, Littlebrook Generating Station, near Dartford, Kent, by 25th May.

Kingston Power Station

ASSISTANT ENGINEER (Relief) (Vacancy No. 106/60). The successful applicant will be given control room training and will be required to assist Charge Engineers in operational duties and to act as an observer in testing of plant. General engineering experience and/or engineering apprenticeship preferred.

Salary N.J.B. Class G, Grade 14, £650-£695, including London allowance, plus shift allowance when applicable.

STATION SHIFT CONTROL ENGINEER (Vacancy No. 107/60). Applicants should have had experience in the control of modern turbo-alternator plant and should preferably hold H.N.C. in Engineering.

Salary N.J.B. Class G, Grade 10, £955-£1,000 per annum, including London allowance and shift allowance.

Applications giving age, details of experience, present position, etc., and quoting vacancy number, to Station Superintendent, Kingston Power Station, Down Hall Road, Kingston-upon-Thames, by 25th May.

W. H. DUNKLEY,
Divisional Controller.

4438

PORT OF MANCHESTER

Electrical Assistant

THE MANCHESTER SHIP CANAL COMPANY have a vacancy for an ELECTRICAL ASSISTANT in the Mechanical Engineer's Department.

Applications for the position are invited from candidates, who should be not more than 40 years of age, with either a University Degree or Corporate Membership of the Institution of Electrical Engineers, and with experience in the design, layout and maintenance of electrical equipment appertaining to dock and railway undertakings. The successful candidate will be required to pass a medical examination and to become a member of the company's contributory superannuation scheme.

Applications, containing full particulars of age, education, qualifications, experience and salary envisaged, should be addressed to the Mechanical Engineer, Manchester Ship Canal Company, Ship Canal House, King Street, Manchester, 2, not later than 4th June, 1960. Envelopes should be marked "E.A. Personal."

4408

CITY OF SALISBURY
SOUTHERN RHODESIA

Vacancy for Electrical Engineer (Protection)

Salary scale £1,025 × £102 10s. to £1,332 10s. × £76 17s. 6d. to £1,563 2s. 6d. × £51 5s. to £1,768 2s. 6d. per annum

APPLICATIONS are invited for the fixed establishment post of ELECTRICAL ENGINEER (Protection) in the Salisbury Municipal Electricity Department, on the scale £1,025 × £102 10s. to £1,332 10s. × £76 17s. 6d. to £1,563 2s. 6d. × £51 5s. to £1,768 2s. 6d. per annum. No allowances are payable.

Commencing salary is based on qualifications nd experience. There is a barrier at £1,563 2s. 6d. per annum, above which no engineer can rise without being a Corporate Member of the British Institution of Electrical Engineers, and the maximum entry point into he grade is £1,614 7s. 6d. per annum.

Candidates must be Graduates of the British Institution of Electrical Engineers and/or hold an equivalent electrical engineering degree, and have had not less than five years' experience in general protection work.

Consideration however will be given to applicants who have not the above qualifications but who have had extensive practical experience. The salary scale applicable in such instance will be £1,568 5s. × £51 5s. to £1,722 per annum, commencing salary being at the minimum of the grade.

The successful applicant will work under the direction of the Test Engineer in the Consumers' Engineers' Section and his duties will comprise mainly:—

1. Design and commissioning of all types of protection schemes on generators, feeders, motors, transformers and other types of electrical equipment.
2. Determination of relay settings and the calculation of fault currents over the system.
3. Supervision of staff engaged in the maintenance and repair of all relays and instruments associated with protection schemes.

The Department has an extensive supervisory indication, control and telemetering scheme and experience with similar equipment is desirable. Experience with electronic equipment would be considered an advantage.

The appointment will be subject to the City Council's Service and Leave Regulations. The successful candidate will be required to furnish to the Council a satisfactory medical certificate of fitness and to serve a probationary period of not less than six months, and if thereafter confirmed in his appointment, to join the Southern Rhodesia Local Authorities' Joint Pension and Widows' and Orphans' Fund. He must also be able to comply with the requirements of the Federal Immigration Authorities.

Candidates must submit full particulars of their qualifications, training and experience, giving details of positions held and salaries received. Age, place of birth, nationality and marital state should be stated and copies of not more than three recent testimonials may be forwarded.

Particulars of the undertaking and a summary of conditions of service, pension and leave entitlements, etc., may be obtained from Davis & Soper Limited, 52-54, St. Mary Axe, London, E.C.3, to whom applications must be submitted on or before 4th June, 1960. 4453

SOUTH OF SCOTLAND ELECTRICITY BOARD

Ayrshire Area

First Assistant District Engineer, Ardrossan

APPLICATIONS are invited for the above superannuable post, the salary of which will be within the N.J.B. Agreement, Class F, Grade 4 (£1,095/£1,170).

Applicants should preferably be Chartered Electrical Engineers or hold equivalent qualifications; have had a sound technical and practical training and comprehensive experience in the planning, construction, operation and maintenance of distribution systems up to 33 kV.

Application forms, which may be obtained from G. F. Moore, Manager, Greenholm Street, Kilmarnock, should be received not later than Friday, 27th May, 1960. 4451

THE HARLAND ENGINEERING COMPANY LTD., ALLOA

require several

SENIOR DRAUGHTSMEN

in connection with an expanding development programme in the field of centrifugal pumps, hydraulic turbines and medium/large electrical rotating machinery.

Experience in these products, whilst advantageous, is less important than thorough knowledge of modern mechanical engineering stress analysis, materials selection and application, and up-to-date draughting methods.

The company offers good salaries and working conditions with contributory pension scheme, extended holidays after twelve months, and assistance with house acquisition or purchase.

Replies giving full particulars of age, qualifications and experience will be treated in strict confidence and should be sent marked "Personal" to Chief Draughtsman, B. E. P. Works, Alloa, Scotland.

308

A. C. MORRISON (ENGINEERS) LIMITED

A. C. MORRISON (ENGINEERS) LTD. manufacturers of a wide range of specialised engine-driven generating equipment and complex associated control gear, invite applications for the following vacancies :—

Senior Sales Engineer

The successful candidate should be a qualified engineer, preferably with the knowledge of small and medium-sized generating sets. He will be required at an early date to take over responsibility for an important section of the company's sales activities, and appropriate technical and commercial experience is therefore essential.

Sales and Contracts Engineers

Two engineers are also required for general sales, estimating and contracts duties. Applicants should have a sound electrical engineering training and possess the ability to familiarise themselves within a reasonable time with the technical details of the company's products. Commercial experience is desirable but not essential.

The company also manufactures various types of mechanical power units and a vacancy may exist for a candidate with sound general engineering training, particularly in the fields of small and medium-sized engines, but with limited electrical experience.

The above positions command a good commencing salary together with membership of the company's superannuation scheme after a qualifying period, and there will be scope for advancement in an expanding organisation. The work is of an interesting nature in pleasant surroundings and personal initiative will be encouraged.

Applications by letter only in the first instance stating full details of career, present salary and salary expected should be addressed to the Secretary, A. C. Morrison (Engineers) Ltd., Town Quay, Southampton. 4445

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

FOURTH ASSISTANT ENGINEER required in the Divisional Electrical Department for maintenance operations, site works supervision and commissioning of plant.

Superannuation scheme. Salary Class AX/DX, Grade 7, £840-£965/£1,040 per annum.

Candidates should possess qualifications leading to A.M.I.E.E. and should have had experience in the testing of both primary and secondary electrical equipment on the transmission system and in generating stations.

Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be returned to him by 21st May, 1960, together with any additional information in support of your application. Please quote vacancy SW/AV/54/60. 4457

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment:—

GENERAL ASSISTANT ENGINEERS
RYE HOUSE GENERATING STATION

Salary Class G, within the range of Grades 15/13, £560 × £15 to £700 per annum, plus £90 shift allowance when required to work on shift.

The commencing salary will depend upon the duties and responsibilities.

Duties include assisting in the electrical control room and experience in the technical operation of electrical, boiler house, and turbine house plant, testing, etc. The posts will provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a generating station and/or technical training to the standard of Ordinary National Certificate or its equivalent will be an advantage.

Applications quoting reference S.V. No. 1312, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 21st May, 1960. 4456

SOUTHERN ELECTRICITY BOARD

General Assistant Engineer (Z.1203)

Melksham District of No. 2 (Newbury) Sub-Area. Commencing salary N.J.B. Class G, Grade 14, £610 per annum rising to £700, maximum of Grade 13. N.J.B. conditions of service.

The duties of the post will be to assist with distribution including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc. Applicants should possess suitable technical qualifications.

Demonstrator (Z.1206)

Swindon District of No. 2 (Newbury) Sub-Area. Salary N.J.C. Grade 1 (£525-£625 per annum). N.J.C. conditions of service.

Applicants should be qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus, and to assist in showroom duties. The possession of an E.A.W. Certificate or equivalent domestic science qualification would be an advantage.

The successful candidates for the above posts will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him, quoting the appropriate "Z" number, not later than 23rd May, 1960. 4446

ELECTRONICS INSPECTION

GOOD wages and first-class conditions will be offered to experienced

FAULT FINDERS

and

WIRING INSPECTORS

in connection with advanced servo/electronics equipment of precision standard, E.I.D. approval necessary.

Rates of pay reviewed after one month and adjusted according to results.

The positions are located at modern factories in the

LONDON/MIDDLESEX

area, adjacent to a number of pleasant residential districts.

Applicants are invited to write stating full details of their experience and rates of pay anticipated to—Box 4410.

***Situations Vacant** (continued)*

EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

APPLICATIONS are invited from suitably qualified and experienced persons for the following position:—

FOURTH ASSISTANT DISTRICT COMMERCIAL ENGINEER,
Grantham District (Vacancy No. 49/60).

Salary N.J.B. Class E, Grade 10, £710 × £15 to £755 per annum.

Candidates should have a sound general education and the possession of the Higher National Certificate in Electrical Engineering will be an advantage.

A thorough knowledge of all types of electrical installations is desirable and applicants must be capable of planning and estimating for domestic, commercial and small industrial installations and giving advice to consumers on the selection and use of electrical apparatus.

Applications stating age, education, experience, qualifications, present position and salary should be forwarded to the Manager, Lincolnshire Sub-Area, North House, Grantham, within fourteen days of the date of this advertisement.

4454

CITY OF BIRMINGHAM HOUSING MANAGEMENT DEPARTMENT

Assistant Electrical Inspector
Misc. Grade VI (£735-£795)

APPLICANTS should have had a comprehensive training in electrical engineering and some experience in estimating, the examination of domestic installations and the submission of reports thereon, preparation of specifications, supervision of work carried out by contractors, and the checking of invoices.

Applications in writing, giving age, experience and present post, to the undersigned, not later than Friday, 20th May, 1960.

J. P. MACEY,
Housing Manager.

Housing Management Dept.
Bush House,
Broad St., Birmingham, 1.

4407

DRAUGHTSMAN (LAYOUT)

for switchgear protection schemes. Salary commensurate with experience and qualifications.

Apply stating age, experience, qualifications and present salary to :—

FULLER ELECTRIC LTD.
Fulbourne Road, London, E.17

4422

TECHNICAL ELECTRICAL ASSISTANT

required by

WOODALL-DUCKHAM CONSTRUCTION COMPANY LTD.

Age 26-35. Qualifications to H.N.C. or near equivalent. Graduate Membership of the Institution of Electrical Engineers an advantage. Experience required in preparation of electrical specifications for the purchase of motors, control gear, switchgear and distribution equipment (including all power and lighting cabling) for heavy industrial installations. Experience is also essential in the preparation of wiring diagrams for power and lighting installations and a knowledge of sequence interlocking systems.

Work is of an interesting nature with plenty of scope for applicants desiring to broaden their experience.

Salary in accordance with qualifications and experience. Good working conditions. Staff bonus, pension and insurance schemes. Five-day week. (Normal hours 9 a.m. to 5 p.m.). Canteen.

Apply in writing stating age, education and experience to The Personnel Officer, Woodall-Duckham Construction Company Ltd., 63/77, Brompton Road, London, S.W.3.

4448

PAKISTAN

AN expanding firm of electrical manufacturers of motors (up to 30 h.p.), transformers (5/1,600 kVA) and switchgear (11 kV) urgently requires to fill the following appointments in the Punjab :—

WORKS MANAGER

ASSISTANT WORKS MANAGER

CHIEF TRANSFORMER DESIGNER

Candidates should be Corporate Members of the Institution of Electrical Engineers or have an equivalent qualification, and for the managerial positions have experience of production, design and planning. It is essential to have had experience in the manufacture of motors, transformers and switchgear.

Age 35-50; salary £1,800-£2,500, inclusive of allowances; contracts initially for 3 years.

Send full particulars to :—

The Registrar
PROFESSIONAL ENGINEERS APPOINTMENTS BOARD
201, High Holborn, London, W.C.1

4441

UNIVERSITY OF AUCKLAND
New Zealand

SCHOOL OF ENGINEERING

APPLICATIONS are invited for the following appointment:—

SENIOR LECTURESHIP IN ELECTRICAL ENGINEERING.

Candidates should be University Graduates in Electrical Engineering; a higher degree would be an advantage. Previous lecturing experience is not essential.

The salary scale for a Senior Lecturer is £1,750 per annum rising to £2,000 per annum by three annual increments, the first two of £100 and the third of £50. Commencing salary within this scale will be determined according to qualifications and experience. An allowance is made towards travel and removal expenses.

Further particulars and information as to the method of application should be obtained from the Secretary, Association of Universities of the British Commonwealth, 36, Gordon Square, London, W.C.1.

Applications close, in New Zealand and London, on 30th June, 1960.

4450

POWER STATION CHEMIST ELECTRICITY DEPARTMENT CAPE TOWN, SOUTH AFRICA

A VACANCY exists in the Generation Branch of the Electricity Department of the City Council of Cape Town, South Africa, for a suitably qualified person for the position of POWER STATION CHEMIST.

The scale of pay (total emoluments) applicable to the post is £1,560 with two increments of £60 to a maximum of £1,680 per annum.

Applicants must possess a degree in Chemistry of a recognised university or an equivalent qualification. They must have had experience in a power station laboratory and be familiar with the methods of sampling and analysis of materials used in a power station, preferably with advanced steam conditions. A knowledge of nuclear physics and the use of radio-active isotopes will be an advantage.

Persons possessing the requisite qualifications and experience are invited to apply not later than MONDAY, 23rd MAY, 1960, and to address their applications to :—

Messrs. Merz and McLellan
Carliol House
Newcastle upon Tyne
England

from whom further particulars relating to the vacant position may be obtained.

4287

CITY COUNCIL OF SINGAPORE

APPLICATIONS are invited for the appointment of ELECTRICAL SUPERVISOR on temporary contract for 3 years in the CITY WATER DEPARTMENT.

Qualifications required are G.I.E.E. with 3 years' practical experience of H.T. electrical plant and pumping plant, or H.N.C. (Elect.) with 5 years' experience as above, or C. and G. (Final) Elect. Eng. Practice (Parts I and II) with 7 years' experience as above.

Basic salary within scale $695 per month to $1,280 p.m., with increments of $45 p.m. annually. Expatriation allowance payable in addition to basic salary, the current rates varying from $205 p.m. to $275 according to basic salary. $1 Malayan = approx. 2s. 4d. Starting salary according to qualifications and experience, and candidates are invited to state minimum salary acceptable.

Further details regarding quarters, paid air passages, leave, etc., are given in a memorandum which will be sent to qualified candidates upon application to Messrs. Allen & Williams, 8, Clarges Street, Piccadilly, London, W.1, the Council's London Agents, to whom full applications in DUPLICATE must be submitted by Tuesday, 24th May, 1960.

4385

FAWCETT PRESTON & CO. LTD.
Bromborough, Cheshire

require a SALES ENGINEER for appointment to its Electrical Division Outside Sales Staff to operate in the Midlands and Southern England from London on Technical Sales duties.

Experience of industrial and traction resistors and their application is desirable, and preference will be given to applicants holding H.N.C. (Elec.) or equivalent.

Apply giving full details and present salary to General Sales Manager, at Bromborough.

4427

PATENTS

MALE TECHNICAL ASSISTANTS

required by

IBM UNITED KINGDOM LIMITED

Graduates (aged 20 to 24) in Electrical Engineering or Physics and who have a definite interest in Electronics will be given preference.

Selected candidates will be trained at our Head Office in London or at the IBM Laboratories near Winchester, to prosecute patent applications for inventions in the computer field. This training will eventually lead to qualification as Patent Agent.

This is an outstanding opportunity for ambitious graduates to enter a very rewarding profession. A good and rapidly progressive salary is offered together with free life insurance and pension.

Applications should be made in writing to the Personnel Manager, IBM United Kingdom Limited, 101, Wigmore Street, London, W.1, quoting Ref. 60/33.

4425

AUTOMATIC MACHINE TOOL CONTROL

A YOUNG Electrical Engineer required by progressive machine tool company for their expanding electrical engineering department handling automation and prototype development programme. The position has good prospects for a graduate I.E.E. or equivalent, preferably with electrical manufacturing training and a keen interest in development work.

Five-day week, canteen, social club and pension scheme.

Applications in confidence, giving age, qualifications and experience to the Electrical Engineer, The Churchill Machine Tool Co. Ltd., Broadheath, Altrincham, Cheshire.

4288

RELIANCE CORDS & CABLES LTD.

SENIOR INSPECTORS

for Cable Factory, London District, manufacturing rubber and plastic cable principally for the telecommunications industry, with possibilities of early promotion. Experience of Government inspection procedures preferable.

TECHNOLOGIST

with experience in the handling and testing of materials for the foregoing types of cable.

Apply in writing with particulars of previous experience to :—

Chief Engineer
RELIANCE CORDS & CABLES LTD.
Fingal Works, Staffa Road
Leyton, London E.10

when arrangements for an interview will be made.

4354

COVENTRY TECHNICAL COLLEGE

Principal :
H. C. Smith, M.Sc., Ph.D., F.R.I.C.

Electrical Engineering Department

APPLICATIONS are invited for the post of LECTURER in Electrical Engineering, uties to commence on 1st September, 1960, r from a date to be arranged.

The person appointed will be required to ach Electrotechnology up to O.N.C. level and supervise the Machines Laboratory.

Candidates must possess graduate or equivaent qualifications, together with appropriate ndustrial and teaching experience.

Salary in accordance with the Burnham Techical Scale, £1,370 × £35 (4) and £40 to 1,550 per annum. In certain circumstances e starting salary may be above the minimum the scale. Salary scales for women are ightly less, but reach equal pay in April, 961.

Further particulars and application forms on pplication to the Principal, Coventry Technical ollege, Butts, Coventry (stamped addressed olscap envelope required).

W. L. CHINN,
Director of Education.

4461

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

(Vacancy No. 117/ER/60)

APPLICATIONS invited for superannuable appointment of STATION SUPERNTENDENT, ROGERSTONE POWER TATION, MON.

Salary National Joint Managerial and Higher xecutive Grades, Class A.5, £1,540-£1,740 er annum.

Applicants should preferably be Corporate lembers of the Institution of Mechanical nd/or Electrical Engineers, and have had nsiderable experience in the operation, mainnance and administration of a modern power ation.

Applications stating details of engineering and anagement training and experience should be ddressed to the Secretary, South Wales Divion, Central Electricity Generating Board, wyn-y-fedwen Road, Gabalfa, Cardiff, so as reach him not later than 25th May, 1960.

4439

FULLER ELECTRIC LTD.

ave vacancies for ELECTRICAL AND IECHANICAL DETAIL DRAUGHTSMEN the Transformer and Control Gear Drawing ffices.

Progressive salary scale and excellent working nditions.

Apply stating age, experience, qualifications nd present salary to :—

Personnel Manager
FULLER ELECTRIC LTD.
Fulbourne Road, London, E.17

4421

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment :—

MAINTENANCE ENGINEER
(Mechanical),
GOLDINGTON GENERATING
STATION (Near Bedford)
(S.V. No. 1326).

Salary N.J.B. Class H, Grade 6, £1,095 × £20 to £1,170 per annum.

Applicants should have served an apprenticeship and have had experience with the maintenance of modern pulverised fuel-fired boilers, turbines and coal and ash handling plants. Operating and supervisory experience and technical qualifications to at least Ordinary National Certificate (Mechanical) standard will be an advantage.

Applications, stating age, details of experience and qualifications, quoting Ref. S.V. No. 1326, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 21st May, 1960.

4423

EAST MIDLANDS ELECTRICITY BOARD

Third Assistant District Engineer: Lincoln District

(Vacancy No. 5/60)

APPLICATIONS are invited from suitably qualified and experienced persons for the above position.

Salary N.J.B. Class F, Grade 9, £815 × £15 to £860 per annum.

The duties of the post will be to assist in the planning, construction, operation and maintenance of underground and overhead systems up to and including 11 kV.

The successful candidate will be required to reside in or near the City of Lincoln and to undertake standby duty.

Applications in writing giving details of age, experience and present position, and quoting the above vacancy number, should be forwarded to the Manager, Lincoln District, Brayford Side North, Lincoln, within fourteen days of the date of this advertisement.

4389

THE ELECTRIC CONSTRUCTION COMPANY LIMITED

Bushbury House
57, Buckingham Gate, London, S.W.1

APPLICATIONS are invited for an Inside Engineer for the London Sales Office, with experience of rotating machines and control gear, and preferably also transformers and switchgear.

The position offers ample scope, interest and variety, and there are contributory pension arrangements.

Applicants should give chronological details of training and experience and should state technical qualifications and age. Apply to the London Area Sales Manager at the above address.

4390

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Assistant Control Engineer, System Control

APPLICATIONS are invited for the above appointment at Central Control, Pitlochry. Applicants should have minimum technical qualifications of Higher National Certificate standard, and should preferably have had power station and 132 kV system operation experience.

Salary N.J.B. Class AX/DX, Grade 6, £925-£1,140 per annum, plus 10% allowance for shift duties. Placing on the salary scale will be in accordance with experience and qualifications. Tenancy of a house may be available to the selected applicant.

Applications should be made on the standard application form which may be obtained from the Senior Operation Engineer, North of Scotland Hydro-Electric Board, Port-na-Craig, Pitlochry, Perthshire, to whom completed application forms should be returned not later than 26th May, 1960.

4455

MINISTRY OF AVIATION

ELECTRICAL ENGINEERS (Assistant Signals Officers) required for aviation telecommunications and electronic navigational aids. Minimum age 23; 1st or 2nd Class Degree in Physics or Engineering, or A.M.I.E.E. or A.F.R.Ae.S. (candidates with Parts I, II and III of A.M.I.E.E. or Parts I and II of A.F.R.Ae.S. or equivalent, or of very high professional attainment without these qualifications considered.

Salary £690 (age 23) to £1,125 (age 34), max. £1,300. Slightly lower outside London and for women.

Further details and forms from Ministry of Labour, Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting D.161/OA.

264

SALES ASSISTANT

OPPORTUNITY exists in sales office of established progressive firm of manufacturing electrical engineers for young man of initiative, preferably with knowledge of export procedure. Prospect of advancement. Pension scheme.

Full details in strict confidence to:—

Sales Manager
SERVICE ELECTRIC CO. LTD.
Honeypot Lane, Stanmore, Middx.

4311

OLDHAM EDUCATION COMMITTEE

Municipal Technical College

APPLICATIONS are invited for the post of LECTURER IN ELECTRICAL ENGINEERING to teach Ordinary National Certificate, Higher National Certificate and Electrical Technicians' subjects. Candidates must be well qualified, together with good industrial experience and/or teaching experience.

Burnham (Further Education) scale, £1,370 × £35 to £1,550 per annum.

Further particulars and forms of application from the Director of Education, Education Offices, Union Street West, Oldham.

4405

UNIVERSITY COLLEGE, CORK

Lectureship in Mechanical Engineering

APPLICATIONS are invited for the vacant full-time, pensionable LECTURESHIP in Mechanical Engineering. Salary scale £1,242 × £54 to £1,620 per annum, plus children's allowances. Non-contributory pension scheme.

Particulars may be had from the undersigned.

Latest date for receipt of completed applications, 12 noon on 30th June, 1960.

JAMES HURLEY,
Secretary.

4404

PERSONAL ASSISTANT TO MANAGING DIRECTOR

Outstanding technical and commercial ability are essential for this important post as well as practical experience and knowledge of motor control and low voltage switchgear. Applicants must be qualified and keen to handle and coordinate all types of low voltage switchgear schemes and contracts. Initiative, drive and organising personality is considered of particular importance.

This is a worthwhile opportunity for the right man.

Applications in strictest confidence to:—

The Managing Director
ELECTRO MECHANICAL
MANUFACTURING CO. LTD.
Marlborough Street
Scarborough

4449

Situations Vacant (*continued*)

TECHNICAL ASSISTANT

OPPORTUNITY offers in established progressive firm of manufacturing electrical engineers for young engineer/draughtsman well grounded in all aspects of profession. Prospect of advancement. Pension scheme.

Full details in strict confidence to:—

Managing Director
SERVICE ELECTRIC CO. LTD.
Honeypot Lane, Stanmore, Middx.
4312

TRANSFORMER DESIGNER

for transformers and L.F. chokes

(a) Laminated and 'C' Core pattern up to 5 kVA.

(b) Power transformers up to 500 kVA.

Salary according to age and experience. 5-day week. Contributory pension scheme.

Apply:

WILLESDEN TRANSFORMER COMPANY LTD.
Manor Park Road, London N.W.10
(Elgar 5445) 309

SALES MANAGER

A SALES MANAGER is required to take complete charge of internal sales organisation. Must have initiative, be of superior ability and able to control staff. Knowledge of modern languages and able to deal with technical correspondence essential. Experience of electric cable industry an advantage. This is an executive salaried post with pension scheme. Age 32/37 years. Apply—Managing Director, Lindsay & Williams Ltd., Ashton Old Road, Manchester, 11. 4394

TRANSFORMER AND POWER CAPACITOR ENGINEERS

wanted for Sales and Contracts office. Preference given to candidates with H.N.C. or studying for this.

Apply:—

Sales Director
BRYCE ELECTRIC CONSTRUCTION CO. LTD.
Kelvin Works, Hackbridge, Surrey
4465

ELECTRICAL WHOLESALERS (E.W.F.)

SALES REPRESENTATIVE in the London and Greater London areas. Must have established connections with industrial users and first-class contractors and retailers. We have special offers available to experienced applicants who really understand the sales side of the industry. Brief particulars in confidence to Young & Wildsmith Ltd., 35, Little Russell Street, London, W.C.1. 4391

A FOREMAN for electric motor repair shop, experienced in A.C. and D.C. all types. Good opportunity in expanding company. New house available.—Lewis Electric Motors Ltd., Moor Works, Blackamoor Lane, Maidenhead, Berks. 4412

ASSISTANT draughtsman/designer for electrical engineers (London area). Able to assist and prepare quantities, etc. Practical knowledge of factory lighting and power requirements an advantage. Full particulars and salary required to —Box 4208.

ATLAS LIGHTING Limited require a man with wide experience of incandescent lamp manufacture to take charge of high wattage and Group II at their Merthyr Tydfil factory. Salary will be commensurate with experience and suitability for this post. Write in confidence, giving a brief outline of qualifications and experience to—The General Manager, Atlas Lighting Limited, Swansea Road, Merthyr Tydfil, Glam., S. Wales. 4320

BOOK-keeper/accounts typist required. Permanent. Write stating age, exp., salary reqd.—Secretary, Alliance Electrical Co., 2, Henrietta Street, London, W.C.2. 4468

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., Longridge House, Manchester, 4. Electrical surveyor required in Scotland. Permanent position carrying progressive salary scale £800 to £1,190 and non-contributory pension. Candidates, aged 26 to 32, with H.N.C. in Electrical Engineering or Grad. I.E.E., and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. 4418

BRYCE ELECTRIC CONSTRUCTION Co. Ltd. have vacancies for senior and junior power capacitor and transformer development engineers. Write Chief Engineer, Bryce Electric Construction Co. Ltd., Kelvin Works, Hackbridge, Surrey, stating age, experience, qualifications, and salary required. 4321

CONSULTING engineer requires electrical engineer/draughtsman, aged 20/25, to assist in the preparation of installation design on projects mainly large and interesting, including universities, hospitals, commercial development and industrial expansion schemes, etc. Applicants must state age, educational background, qualifications, experience and salary required.—G. H. Buckle & Partners, 2, Harrington Gardens, London, S.W.7. 4469

CONSULTING engineers require senior and junior electrical engineers for the design and supervision of electrical installations in all types of buildings. Good salaries and working conditions available to suitable applicants. Write giving full details to — Box ER.349, L.P.E., Romano House, 399/401, Strand, London, W.C.2. 4281

CONTRACT electricians required for general installation work. Assistance with housing may be arranged for suitable applicants. Apply First Garden City Ltd., Broadway, Letchworth, Herts. 4430

CONTRACTS engineer required by Bastian & Allen Ltd., Ferndale Terrace, Harrow, manufacturers of electrode boilers. The work is interesting and varied, and requires familiarity with conventional electrical controls. This is a progressive position in a s mall expanding organisation. 4413

CONTROL circuit engineer and estimator for automatic motor control gear; O.N.C. or H.N.C. desirable with previous experience; permanent and pensionable situation. Apply giving details of age, experience and present salary, to—The Managing Director, British Klockner Switchgear Ltd., Chertsey, Surrey. 129

DEVELOPMENT engineer for work in electric heater development laboratory. Minimum qualification O.N.C. Salary according to ability and experience.—Personnel Officer, E. K. Cole Limited, Malmesbury, Wilts. 4316

DRAUGHTSMAN (junior) electro/mechanical; interesting situation with excellent prospects. Apply giving full details of age, experience and present salary, to—The Managing Director, British Klockner Switchgear Ltd., Chertsey, Surrey. 130

ELECTRIC cable manufacturer requires London representative with proved connection wholesalers, contractors, industrial users, etc. Good basic salary and commission. Apply in strict confidence.—Box 4406.

ELECTRICAL contracting. A technical representative required to call on prospective customers in Eastern Counties. Should be capable of advising, planning jobs and estimating. Very liberal salary, commission and expenses for keen man with ability to secure remunerative orders. Opportunity for further advancement with possibility of ultimate managerial post. Apply in confidence to Managing Director.—Box 7528.

ELECTRICAL draughtsman. A good opportunity is open for a man of above average capability with a firm of consulting engineers in London to undertake the preparation of design, drawings and specifications for power lighting installations covering all types of commercial and industrial buildings. Good salary offered to the right man. Write in the first instance stating age, salary and experience to—Box 4283.

ELECTRICAL engineer required for Glasgow office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler & Electrical Insurance Co. Ltd., 98, West George Street, Glasgow, C.2. 4419

ELECTRICAL draughtsmen required, familiar with power and lighting installation design for all types of commercial and industrial buildings. A knowledge of motor control applications an advantage. Please apply giving age, training and experience to—Box 4282

ELECTRICAL engineer. Electrical contractors, head office London, require capable and experienced sales and contract engineer. Pensionable position. Age 35/45. State salary required.—Box 7526.

ELECTRICAL engineer intermediate draughtsman with experience in the design of power and lighting installations for modern building projects are offered progressive careers. Five-day week and all mod. cons. Apply in confidence to—Pashler & Partners, Consulting Engineers, 73, Southampton Row, London, W.C.1. 4269

ELECTRICAL wholesalers require experienced sales representative for Black Country, Birmingham area. Car provided. Apply with full details of previous experience and salary required to—Box 4322.

ELECTRICAL wholesalers require really experienced sales representative for Black Country area. Progressive opening for right man. Car provided. Apply with full details of previous experienee and salary required to—Box 4431.

ELECTRICIANS, first-class, good technical knowledge, experience installation work. Two years overseas, excellent situation, large electrical concern. Write age, experience, copy references.—Box 4470.

E.W.F. wholesaler requires experienced representative to cover the Midlands area north of Birmingham. The selected applicant will be considered for promotion to branch manager and only representatives with experience in the electrical trade will be considered. Car provided and high salary envisaged. Reply Reference HBJ. — G. A. Nicholas Ltd., 69, Horseley Heath, Tipton, Staffs. 4471

HEATING engineer for leading manufacturers of electric floor warming system. Grad. I.H.V.E. minimum standard of qualification with experience in heat loss and design calculations. Scope and prospects in expanding organisation for individual with initiative and having electrical bias. Full details stating salary required to—Box 4323.

INSPECTOR required for small factory in N. London manufacturing sheathed heating elements and electric domestic appliances. Previous industrial experience in similar field essential. This is a staff appointment with a commencing salary in region of £12/£13 p.w. Write — Box ER.352, L.P.E., Romano House, 399/401, Strand, London, W.C.2. 4290

JUNIOR electrical draughtsman, O.N.C. standard, required for general engineering and electrical motor manufacturers in N. London area. Permanent pensionable positions with free life assurance. Full details to—Box 4345.

JUNIOR electrical engineer required to assist in the development and laboratory testing of induction watthour meters and associated test equipment. Minimum educational requirement H.N.C. (Electrical). Write giving full details of experience to the Personnel Manager, Sangamo Weston Ltd., Cambridge Road, Enfield, Middx. 4472

JUNIOR transformer engineer to assist with design of wide range of small and medium power transformers. Training should be to O.N.C. level with a minimum of one year's experience in this field. Salary dependent on age and experience. Please write, with full details, to—Box 4393.

LEADING manufacturer of engine-driven generating sets up to 350 kW seeks engineers for design, development and contracts work. Good knowledge of schematic diagrams an advantage. Engineer also required for service and installation work, competent to deal with mechanical and electrical applications. Permanent employment with pension fund.—Box 4473.

LIFTS design and detail draughtsmen offered permanent positions in modern drawing office in Nottingham. Write full details—W. J. Furse & Co. Ltd., Traffic St., Nottingham. 4395

STOREKEEPER required, only first-class applicants with substantial experience in electrical wholesaling will be considered. More than average salary is offered in return for ability and efficiency. Permanent superannuated post for right man desirous of progress. Canteen available.—Halsey's, Fulham 3355. 156

REPRESENTATIVE required by leading electrical wholesalers in Hammersmith, London, area. Excellent opportunity for energetic man with an existing connection and proven sales record. Non-contributory pension and life insurance. Applicants should state age and give full details of past and present employment to Personnel Manager, Wholesale Fittings Co. Ltd., 46/54, Commercial St., London, E.1. 4414

REPRESENTATIVES required calling on wholesalers and retailers for most competitive distributors in the trade. Accessories, lamps, fittings and appliances. Only top-rate men with electrical trade connections need apply.—University Distributing Co. Ltd., 66/68, Great Eastern Street, London, E.C.2 (Phone, SHOreditch 8282). 4415

SALES assistants required for busy trade counter of electrical wholesalers. Only experienced men with intimate knowledge of accessories and installation materials considered. Highest salary in trade. Non-contributory life and pension scheme. L.V.s. Phone Personnel Manager.—BIS. 4356 (London). 4432

SALES engineer required with established connection and knowledge of off-peak storage heaters or motor control gear, preferably living north of Thames. Excellent prospects for man of initiative. Car provided.—Box 7525.

SALES engineers. Young engineers over 21 years required for indoor staff of sales department. Technical and works training in electrical engineering practice, at least to O.N.C. standard, is required by West London engineering company specialising in explosion-proof and industrial electrical control gear as well as other electrical equipment for industry. Candidates, in replying, should state age, training, qualifications and anticipated remuneration, in confidence, to—Box 182.

SENIOR and junior electrical design engineers/draughtsmen required for consulting engineers' office. 5-day week, luncheon vouchers, spring and summer holidays. Applicants for senior positions must be experienced in design of electrical services for modern hospitals, universities, factories, etc. Please apply stating age, experience and salary required to— . Stinton Jones & Partners, 21, Gloucester Place, London, W.1. 185

SENIOR resistance welding draughtsmen. Fully conversant with standard techniques and multi-head design. Scope for initiative. Maximum qualification O.N.C. or equivalent. Junior position also available. Good prospects, superannuation, bonus scheme, canteen. Apply in first instance to the Technical Director, Siemens-Schuckert (Great Britain) Ltd., Great West Road, Brentford, Middx. 4396

SUPERVISING engineer required by a large manufacturing company for Birmingham area. Applicants should have experience of industrial installation, including installation of H.T. and L.T. cables, substation work and commissioning of transformers and switchgear. Permanent superannuated post. Write stating age, and giving details of previous experience, to—Box 4474.

SUPERVISING engineer required by electrical contractors, Bristol area. Experience of all types of installations and accustomed to handling contracts from estimating to account stage. Write stating full details of experience, age and salary to—Box 4433.

SUPERVISING engineer required for L.V. and 11-kV underground and overhead cable contract work in South Wales. Electricity Board experience desirable. Apply stating age, experience and salary required to—Box 4324.

TECHNICAL clerk required to write requisitions and bills of materials for electrical installation equipment as used in oil and chemical refineries. Must have good knowledge of all types of electrical materials, their use and availability. Office located in Central London. Good conditions, contributory pension scheme, subsidised luncheon club. Write stating experience and salary required to—Box 4346.

TECHNICAL sales engineer required by old-established manufacturer of rotary electrical equipment. This is a senior appointment which will admit to the company's pension scheme. Candidates should have considerable knowledge of electric motors and generators and their applications, and should preferably hold H.N.C. or equivalent qualification. Salaries will be in accordance with experience and qualifications. Any 1960 holiday commitments will be honoured. Please write giving full particulars to—Sales Director, Small Electric Motors Ltd., Churchfields Road, Beckenham, Kent. 4429

TRANSFORMER designer for various types up to 5 MVA capacity. Salary according to experience and qualifications. Full details to—Chief Designer, London Transformer Products Ltd., Industrial Estate, Bridgend, Glam. 4159

TRANSFORMER representative for the electronic and industrial transformer fields. Preference will be given to a person already engaged in a similar capacity. Salary plus commission. Car will be supplied.—Willesden Transformer Co. Ltd., Manor Park Road, London, N.W.10 (Elgar 5445). 310

WINDAK Ltd., Woodside, Poynton, Ches., are seeking the services of an energetic agent to promote the sale of their well-known Windak low-voltage safety electric blanket in Greater London. Applicants should have a sound connection with retail sales, better class stores, electricity boards, etc., and should not carry any competing line. Apply by writing in the first instance. 4434

WORKING foreman required to take charge of small but expanding electrical repair shop in South-West. Applicant must be used to all types of A.C. and D.C. windings and should be able to attend and affect temporary repairs on site. Salary will be in accordance with qualifications and ability. Whilst the present vacancy is for foreman the successful applicant will be expected to take over management at an early date. Reply in confidence to—Box 7521.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

TECHNICAL SALES ENGINEER, knowledgeable East, South, West Africa, normally resident Nairobi, keen join manufacturer view post U.K. or overseas; 45, public school, university, workshop and excellent sales record light/heavy electrical plant, domestic appliances, etc. Interviews U.K.—Box 7529.

A.M.I.E.E. seeks smaller firm following merger and present surfeit of seniors. 45. Well educated. French, German. London based but used to sudden travel. Wide experience of light and medium engineering. More recently sales after many years design, production and installation. Min. starting salary £1,400.—Box 7512.

A.M.I.E.E. (46) desires post with consulting engineers. Experienced lighting, lifts, switchgear, heating, including floor warming. Sound organiser with searching mind, alive to broad policy yet accurate with detail. Based London but used to travel and long hours when necessary.—Box 7531.

DEMOTED due to merger, experienced sales representation, office management, etc. Over 20 years electrical and engineering industries. Aged 38. Resident Leeds.—Box 7519.

DUE to company merger, domestic engineer and manager urgently seeks similar appointment. Would consider representing in S. Midlands and S. Wales areas.—Box 7532.

ELEC. engr., cont./exp., design/est./sup./sales, desires position London or South Coast.—Box 7523.

ELECTRICAL engineer, Assoc.I.E.E., experienced in planning and execution of electrical contracts and work on three continents desires situation with world-wide consultants or engineers. Free for offers from 1st June, 1960.—Box 277.

ELECTRICAL engineer, wide experience in conversion schemes and tariff negotiations with electricity boards. Prepared to act part time for individual or group concerns as adviser.—Box 7515.

ENGINEER (26), H.N.C. (Elect.), seeks permanent progressive position. Fully conversant with the design and scheming of electro-mechanical control systems, etc. Own car, willing to travel. Basic knowledge of electronics. Indentured apprenticeship.—Box 7527.

ARTICLES FOR SALE

600

WARD LEONARD SETS

All incorporating motor generator sets comprising slipring motors normally 1,440 or 960 r.p.m., with direct coupled generators and excitation equipment, together with A.C. and D.C. control gear.

TYPICAL WORK MOTORS

H.P.	Maker	Voltage	Speed
0/340	E.E.C.	0/480	0/1500
0/225/225	HARLAND	0/250	0/1450/1750
0/200	W'HOUSE	0/230	0/1750
0/160	CROM.PARK.	0/480	0/1000
0/150	MET.-VICK.	0/500	0/5000
0/130/150	M. & PLATT.	0/500	0/360/500
0/130	L.D.C.	0/220	0/1000
0/100/100	L.D.C.	0/220	0/750/960
0/95	ALLEN	0/220	0/1300
0/60/60	ALLEN	0/230	0/1300/1500
0/74	L.S.E.	0/480	0/2900
0/60/60	E.E.C.	0/500	0/2000/2900

Others available down to 3 h.p. Wide choice of speeds all covered by guarantee.

GEORGE COHEN
Sons & Co. Ltd.
Wood Lane, London, W.12
(Shepherds Bush 2070)
Stanningley, Nr. Leeds
(Pudsey 2241)
4377

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., s/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
87/89, Sterte Avenue, Poole, Dorset
(Tel.: Poole 272)
371, West Green Road, Tottenham, London, N.15 (Tel.: Bowes Park 7080) 191

MOTORS

NEW CROMPTON PARKINSON, from ¼ h.p. to 80 h.p.; also 6,000 A.C. and D.C. reconditioned Motors and Starters.

IN STOCK HERE

B. E. WHITE
Brantwood Rd., Tottenham, London, N.17
Tel. EDMonton 4621-2 215

RECTIFIERS FOR SALE

WE have just purchased a number of large Mercury Arc Rectifiers with transformers, etc., from 375 kW to 1,500 kW for 3-phase input and for D.C. outputs up to 600 volts.

THOMAS MITCHELL & SONS LTD.
Edgar Street, Bolton
(Phone Bolton 301) 4467

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 55/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 2234/5/6). 169

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

Articles for Sale (continued)

600

COMMUTATOR MOTORS

400/440/3/50

H.P.	Make	Speed	Remarks
67.5/270	B.T.H.	95/370	Schrage
35/70	B.T.H.	650/1300	Schrage
20/40	B.T.H.	300/1000	Schrage
20/40	B.T.H.	45/90	Geared
1.5/5	L.S.E.	900/3000	Ind.Reg.Control
.3/3	L.S.E.	300/3000	Ind.Reg.Control

400 CPS ALTERNATORS

New, 5 kVA, 115/200 volts-3-400 cps, dual voltage (delta/star) sinusoidal wave for, 3,000 r.p.m. Rectifier excited with A.V.R. Ex stock.

Other sizes up to 40 kVA for short delivery.

GEORGE COHEN
Sons & Co. Ltd.
Wood Lane, London, W.12
(Shepherds Bush 2070)
Stanningley, Nr. Leeds
(Pudsey 2241)

4376

ALTERNATORS and generators, all types up to 150 kW.—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 151

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 170/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (ISLeworth 4534/5). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists. — Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

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COMPANY MEETINGS

ABERDARE HOLDINGS LIMITED

Higher Group Earnings

Sir John Pascoe's Review of Activities

THE 24th Ordinary General Meeting of Aberdare Holdings Limited was held on 10th May in London, Sir John Pascoe (the chairman) presiding.

The following is an extract from the review by the chairman which had been circulated with the report and accounts for the year ended 31st October, 1959 :—

The consolidated Profit and Loss Account of Aberdare Holdings Limited and its Subsidiary Companies show profits for the year, before taxation, of £672,425 against £666,729 for the previous year.

After writing off tax at £294,261 against £364,851 and other amounts falling to be written off amounting to £10,832, the net profits of the Group amount to £367,332 against £298,640.

We are recommending a final dividend of 10% less tax, bringing the total for the year ended 31st October, 1959, to 17½% less tax. After the payment of this dividend the figure of undistributed profits of the Group amount to £1,099,386 compared with £863,449.

We have now maintained our dividend at 17½% less tax for six years, but clearly your Directors could not even contemplate an increase whilst the very low price levels obtain in the cable industry.

Aberdare Cables Limited

Sales for the year were considerable lower than that for the previous year. Furthermore, very severe competition developed among the cable manufacturers with consequent lowering of the price level, so that the contribution of the Cable Company towards the profits of the Group fell very considerably in comparison with the year ending 31st October, 1958. Although there has been a slight improvement recently, the price level is still unremunerative, and we cannot look for improved, or even satisfactory results from the manufacture of cable for the current year. Fortunately our cable business was only approximately one-third of our total turnover.

South Wales Switchgear Limited

Our turnover is still increasing with a very satisfactory amount for export. Our manufacturing and research facilities at Blackwood are again being extended, and with the increasing demand for electrical plant, we look to maintain our share, and so face the future with some confidence.

Aberdare Engineering Limited

In our other and smaller Subsidiary Companies, Aberdare Engineering Limited, Ivor Power Specialty Company Limited, and Neckar Water Softener Company Limited, their total contribution to the profits of the Group fell, but not to any very serious extent.

Treforest Electrical Services Limited

Although your Company held a considerable interest in Treforest Electrical Services Limited, control was only obtained shortly before the end of the year, and we have since made an offer for all the Minority Shares. This Company manufactures low-tension switchgear, and its association has been valuable to South Wales Switchgear Limited. We anticipate the extension and expansion of this business.

South Wales Electric (Pty.) Limited and Aberdare Electric Africa Limited

These wholly owned Subsidiary Companies, the one manufacturing switchgear and the other transformers, are gradually establishing themselves in the South African market, and will, we expect, render increasing assistance to South Wales Switchgear Limited and to the profit of the Holding Company in future years.

The Report and Accounts were adopted.

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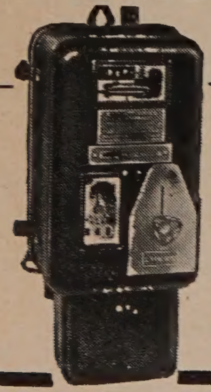

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